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ABSTRACT

This document, the first part of the third volume of a study concerned with the role of institutions of higher education in the development of countries in South-East Asia, appraises the high-level manpower needs of the region. The report is divided into two sections: the first includes the major comments on the position of high-level manpower in the whole region, an extremely brief summary of conclusions reached in each country and a set of four comparative tables. The second consists of ten individual studies in much greater detail containing many individual recommendations. Individual studies concern Burma, Thailand, Malaysia, Indonesia, Cambodia, Viet-nam, and the Philippines. Related documents are HE 004 652, HE 004 651, and HE 004 650. (MJM)

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the development of higher education

higher education and development in south-east asia

volume III, part 1

high-level manpower

by Guy Hunter

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higher education and development in south-east asia

Volume III Part 1

High-level manpower for development

by Guy Hunter

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Preface

The Study of the Role of Institutions of Higher Education in the Development of Countries in South-East Asia is the second project to be carried out under the Joint Unesco-International Association of Universities Research Programme in Higher Education. This programme, which constitutes a novel form of co-operation between an intergovernmental organization and an international academic body, was brought into being at the end of 1959. Directed by a Joint Steering Committee, its purpose is to carry out under the auspices of the two organizations, with the financial support of private foundations or such other private or public bodies as may be appropriate, a series of studies of important problems affecting the organization, operation and functions of institutions of higher education in the present world.

This study was set up with the co-operation and support of the Ford Foundation which generously authorized grants in the amount of $534,000 for its conduct. Work began in September 1961 and from then until April 1965 extensive inquiries were made into the actual and potential contribution of higher education in the countries of South-East Asia to the achievement of the goals of social and cultural development as well as its role in providing the knowledge and skills needed for their economic progress. The *Director's Report* of the study was published in 1966, and a series of detailed *Country Profiles* in 1967. The present report by Mr. Guy Hunter forms the first part of a third volume, the other being a report by Mr. Richard Noss entitled *Language Policy and Higher Education.*

The Joint Steering Committee is indebted to all those who helped to carry out this important undertaking and most specially to the chairman of its Commission of Experts, Sir John Lockwood, Master of Birkbeck College in the University of London and former Vice-Chancellor of the University, who died suddenly on 11 July 1965. Despite other heavy commitments in the United Kingdom and Africa, he had for four years contributed selflessly to the study, travelling extensively in the region, and bringing to the planning and evaluation of the inquiries which were carried out the stimulus of the keen mind of a distinguished scholar and gifted administrator. On behalf of all who were associated with the study we here pay tribute to Sir John for his devotion to the cause of higher education and for the warm generosity of his companionship.

The Committee's thanks are also due to the members of the International Commission of Experts, individually and collectively, for the advice and guidance they gave throughout the study as well as to the consultants, Messrs. Guy Hunter and Richard Noss, for the specialized knowledge and experience they brought to bear on important parts of the undertaking.

The main burden of the work was inevitably borne by the directors of the study and its small staff in Kuala Lumpur, and the Committee is grateful to them for their devotion to a difficult and onerous task. Three directors each made a distinctive contribution to its accomplishment: Dr. Matta Akrawi served from September 1961 to December 1962 and was responsible, with Sir John Lockwood, for the initiation of the study and the successful conclusion of its first phase; Dr. R. M. Sundrum brought to the work the special skills of a political economist and statistician until March 1964; from then on the work went forward under the direction of Mr. Howard Hayden—a comparative educationist, he was responsible for making a synthetic analysis of the complex body of material assembled by the study.

Finally, the Committee wishes to express its appreciation to the Government of Malaysia and to the University of Malaya for the special facilities afforded to the study in Kuala Lumpur and to thank them as well as the governments and university institutions of the other South-East Asian countries associated with the study for their co-operation and assistance.

CONSTANTINE K. ZURAYK,
President, IAU

RENÉ MAHEU,
Director-General, Unesco

Co-Chairmen, Unesco-IAU Joint Steering Committee

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Foreword

In 1959 the United Nations Educational, Scientific and Cultural Organization and the International Association of Universities (IAU) formed a Joint Steering Committee, with the Director-General of Unesco and the President of the IAU as co-chairmen, to plan and implement a concerted programme of research into higher education.

Two years later, with the financial collaboration of the Ford Foundation, the second research project, 'A Study of the Role of Institutions of Higher Education in the Development of Countries in South-East Asia' was initiated.

An office to house the director of the study, the assistant director and a small clerical staff was established through the generosity of Sir Alexander Oppenheim, then vice-chancellor, at the new University of Malaya in Kuala Lumpur, and it was decided to support the work of the Research Office by means of studies in depth to be provided by consultants. Eventually two such studies were completed: one by Dr. Richard B. Noss on 'Language Policy and Higher Education in South-East Asia', and the present study on 'High-level Manpower for Development'.

Clearly one of the most essential contributions, as well as one of the most difficult to quantify, that higher education could offer the developing countries of the region, with their great assets of human resources, was the production of high-level manpower—engineers, teachers, scientists of all kinds, doctors, judges, political leaders, managers, artists and writers. Without these, the full potential of the countries could never be adequately developed.

Accordingly, in 1962, Mr. Guy Hunter (then attached to the Institute of Race Relations, and author of *Education for a Developing Region—A Study in East Africa* and *The New Societies of Tropical Africa*, who in 1962 had prepared, with Professor Harbison, a manpower assessment for East Africa) was appointed to appraise the high-level manpower needs of the region.

This he visited in January and February 1963, and again for three months at the close of the year. His final report was submitted in May 1964.

Mr. Hunter was at liberty to decide on the form in which he would present his material and the conclusions he drew from it. In practice he was in close touch with the Kuala Lumpur office, which became his headquarters during his visits to the region, and an extensive correspondence was carried on during the preparation of the report, drafts of which were sent to Kuala Lumpur. The report and the views therein expressed remain entirely Mr. Hunter's work.

In addition to appearing in its own right as a valuable contribution to the economics of education and the process of planning in the region, the report has also served as one of the basic sources in compiling the Director's Report which forms Volume I of the published documentation. It is very briefly summarized in pages 27-32 of the *Summary Report and Conclusions* published by Unesco and the IAU in August 1965, and, in the Director's Report, Chapter 5 consists of a résumé of the Hunter report—made in Kuala Lumpur (for the interpretation or accuracy of which Mr. Hunter bears no responsibility)—together with a number of editorial comments, some concerned with issues raised by the report, most relating Mr. Hunter's views and findings and data to those to be found in the report as a whole.

No present study is able to keep pace with the march of events in South-East Asia. Since May 1964 the Union of Burma University Education Law has been promulgated, breaking down the two universities at Rangoon and Mandalay into various institutes and colleges, the war in Viet-Nam has greatly intensified, Indonesia has developed her policy of 'confrontation', and Singapore has separated from the Federation of Malaysia. Malaya has adopted a policy of comprehensive education covering the first nine years of school life, while in Sabah it is likely that a foundation will be created to finance the university college which Mr. Hunter foresaw. A second Medical University is developing in Thailand. New educational proposals, unrelated to existing plans, are mushrooming, new five-year plans are about to be published. None of these happenings have invalidated Mr. Hunter's findings—the means may have changed, but not the ends.

Whilst stressing on almost every page the necessity for the improvement of the qualitative aspects of higher education in the region Mr. Hunter has, as his terms of reference required, dealt mainly with the quantitative aspects of education at the third, and consequentially also at the second cycle of second level. The report is based upon 'what seems actually practicable in educational expansion or economic growth, though often the targets are at the very limits of possible effort', and the quantitative assessments represent 'the minimum requirements of manpower trained in modern skills to make possible sustained economic growth and modernization and to provide a gradually improving health service'. Thus a distinction is drawn between what is economically necessary and what may be socially or politically desirable.

A major task of the Director's Report has been an attempt to reconcile and integrate these two aspects of the educational process.

The present report should be of considerable assistance to economic and educational planners in the region in indicating the direction and scale of the studies and projections that their own more detailed planning will require. But more than this it is a practical illustration of those educational values epitomized in a speech by the Director-General of Unesco, Mr. René Maheu, to the Fourth General Conference of the Canadian National Commission for Unesco (12 March 1965): 'It is education which sets a value on the human factor in development and which makes man capable of shaping his history. A country will never be developed unless education is developed. If you wish to replace the idea of developing a country's resources by a true idea of development, that is the advancement of men which will enable them to decide their own destinies, then you must provide them with education. It is through better education that the maximum use can be made of human resources, in which the developing countries are so rich.'

HOWARD HAYDEN,
Director of the Study of the Role
of Institutions of Higher
Education in the Development
of Countries in South-East Asia

Introduction

I was asked to provide some guidance on the probable requirements for high-level manpower in the countries covered by the Research Programme. These were Burma, Thailand, Malaya, Singapore, Indonesia, Philippines, Republic of Viet-Nam,[1] Cambodia and Laos; Sabah and Sarawak were included in the programme after the establishment of Malaysia.

One year was allowed for this work, of which January and February 1963 and November, December, January 1963/64 were spent in the region. I was greatly assisted in this work by being able to take my wife who took notes of interviews and helped in the preparation of this report. I am also much indebted for many educational and demographic statistics to the director and staff of the Study in Kuala Lumpur. I would like also to express my thanks to a very large number of officials and others in all the countries visited for their help and kindness in providing information and facilities.

One year would not be too long to make a proper manpower report on a single large country. It was therefore clear that these studies could only attempt a fairly broad outline of major requirements in the most important fields; detailed studies can, in fact, only be made by the national governments who can obtain the necessary statistics from a large number of government departments and from the whole private sector.

Unfortunately, manpower estimates are almost useless unless they are quantitive. To give even rough estimates of number I was necessarily drawn into the detail of outputs and requirements, in key sectors, in every country. In consequence, I have had to put down actual figures which in some cases rest on the most shaky evidence. This report is therefore the best judgement which I could make in the time and with the evidence at my disposal. I hope that it will stimulate in each country a more thorough and accurate investigation.

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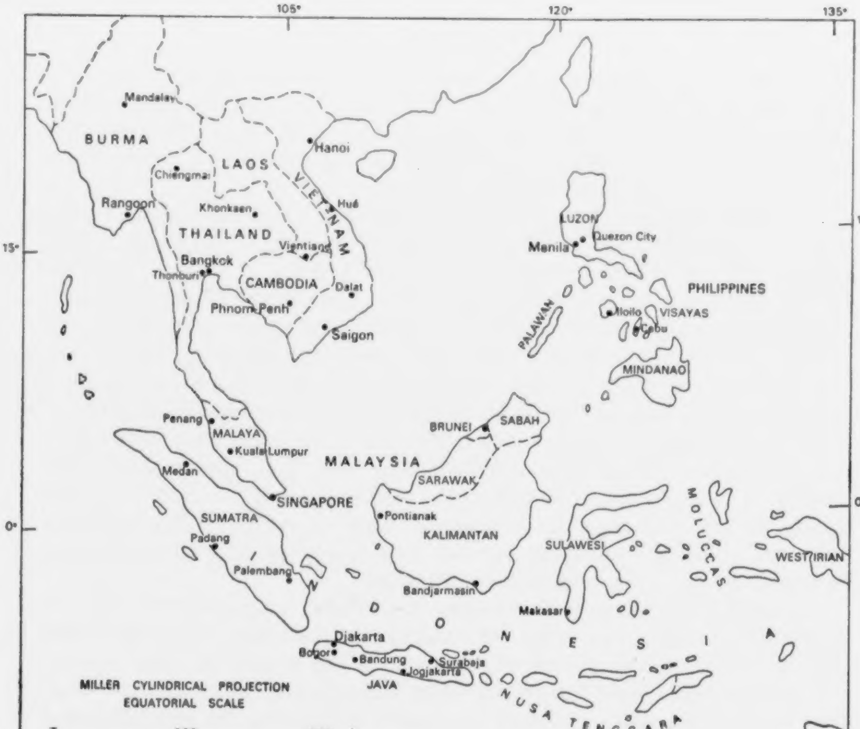
[1] In the body of this publication, 'South Viet-Nam' should be understood to designate the Republic of Viet-Nam, and 'North Viet-Nam' to designate the People's Republic of Viet-Nam.

The report is divided into two sections: the first includes the major comments on the position of high-level manpower in the whole region, an extremely brief summary of conclusions reached in each country and a set of four comparative tables. The second consists of ten individual studies in much greater detail, containing many individual recommendations. Unfortunately, I could not manage to include Laos in the tours or in this report.

GUY HUNTER
May 1964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Surabaja
Jogjakarta
JAVA
NUSA TENGGARA
MILLER CYLINDRICAL PROJECTION
EQUATORIAL SCALE
0 500 1000 Miles
0 500 1000 Kilometres

The above diagrammatic map depicts the region covered by the study. The boundaries shown are not, in some instances, finally determined and their reproduction does not imply official endorsement or acceptance by the United Nations.

General report

GENERAL MANPOWER PROBLEMS OF THE REGION

The economies

Agriculture. In every country of the region over 60 per cent of the population is engaged in agriculture,[1] and in some the proportion is over 80 per cent. Their work produces not only the bulk of basic food supplies but also surpluses of food or other crops by which each country gains its main supply of foreign currency. These earnings are needed for investment in infra-structure and industrialization. The only other substantial sources of foreign exchange come from mining (mainly tin), oil and the entrepôt trade of Singapore in particular.

The growth of population, reaching nearly 3 per cent per annum in most of the region, the low productivity of peasant agriculture, and a concentration on 'industrial agriculture' has resulted in important deficiencies of rice in some countries, notably Malaya, the Philippines and Indonesia, involving quite heavy foreign exchange expenditure in those countries.

It follows that the development of agricultural productivity, and especially of peasant-grown food crops, is by far the highest economic need of the whole region. On it depends not only food supply itself but the capacity to invest in modernizing and, in some degree, industrializing the economies. Productivity cannot be raised very far without a lifting of the whole standard of rural life, and this in turn requires that a far greater supply of trained manpower must be directed to the rural areas, not merely for agricultural improvement but for health, education, technical and administrative services.

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[1] 'Agriculture' includes fishing, forestry, hunting, etc.

This note will be struck again and again in this report: it is by far its most important conclusion.

Commerce. Commercial life is centred on the import-export trade, and therefore largely concentrated in the main ports: Rangoon, Bangkok, Singapore, Djakarta, Manila, Saigon, Phnom-Penh. Combined with the fact that these cities, save now for Singapore, are also capital cities and the seats of government, this has produced two important consequences. First, it has re-emphasized the excessive centralization of trained manpower and the contrast between the modernized city and the still traditional rural area. Secondly, because commerce of this type is international, it tends to leave commercial life largely in the hands of immigrants and expatriates; the network of retail distribution, gradually spreading from ports into the interior, has also mainly been created by these immigrants. In a period of strong nationalist feeling, this has caused resentments. This accounts for the negative attitude towards commerce (which is potentially a great national asset) in so many countries of the region and the failure to devote resources, facilities and trained manpower to its development.

Infra-structure and industry. Industrialization and the development of infrastructure has, on the contrary, attracted great attention and large financial resources, including much foreign aid. Every country has a small nucleus of modern industry mainly based on government or expatriate investment. In Singapore and Manila (to a lesser degree in Bangkok), where commerce and industry are in uninhibited partnership, industrial growth is gathering speed.

What is noticeable, however, is the contrast between a few modern, high-technology undertakings and the generally backward and sparse distribution of small, native-owned and managed industries using local materials to meet local needs. A development and thickening of the industrial sector will depend partly on cheap power supply, partly on better road communication, partly on greater attention to the development of smaller local industries. But above all it will depend on a rise in purchasing power of that huge section—70 to 80 per cent—of population which depends upon agriculture, and which one day will supply both the market and the labour force for industry. There is no evading the priority of agricultural development, as there was not in Britain, in America, in France, in Japan, in China.

Human resources. The manpower problems of these economies fall under three headings: quality, distribution and training. Save in Malaysia and possibly Cambodia, the actual numbers entering the higher level of secondary education would already be sufficient for immediate manpower requirements but for three major difficulties:

1. Far too many fall by the wayside; additionally (or alternatively) too many

of those who reach university courses are quite inadequately prepared for them.

2. Those who succeed are magnetically held in the main towns, and in white-collar occupations. In consequence, the all-important rural economy is starved of energetic and capable young men with modern training.
3. The purely academic education of schools and colleges is not followed by practical training in realistic conditions, save for a tiny minority. In consequence, agricultural graduates do not know farming, engineers are too often ineffective in industry, and above all there is a dearth of practical technicians between the level of artisan and university graduate.

Manpower and education

A crucial distinction must be made at the outset of this report. Throughout, I am using 'manpower requirements' to mean *the minimum requirements of manpower trained in modern skills to make possible sustained economic growth and modernization and to provide a gradually improving health service.*

Quite clearly, this definition may involve much lower demands on the educational system than targets couched in purely educational or cultural terms—for example, universal primary education, doubling of secondary enrolments, or reaching *x* per cent of an age group enrolled in universities. This is not in any way to deny the possible justification of such purely educational targets on their own terms. It seems to me useful to preserve the distinction between what appears economically necessary and what may be educationally desirable, so that policy choices are not confused; and it is my obligation, as a consultant on 'manpower', to confine myself in this way. The distinction is important because the weight of evidence goes to show that developing countries, before 'take-off' have a strictly limited capacity to absorb 'high-level' manpower into employment corresponding to the skills which they have learned. Unrestricted educational expansion may well result—indeed, has frequently resulted—in creating unemployment among graduates, and at great financial cost.

In fact, I believe that the attempt to expand higher education far beyond employment opportunity will be (painfully and expensively) halted by hard economic factors. For, although foreign aid has somewhat masked this fact, ultimately the national budget can only afford an educational investment for which the productive economy can pay. A highly costly investment in university education which produces unemployed lawyers and engineers, who work as clerks and taxi-drivers, is most unlikely to be the wisest use of resources. Moreover, it delays that growth in national income by which new universities could later be properly financed. In practice, the attempt to over-invest in higher education is frustrated by economic stringency (in particular, shortages of trained teachers, laboratories and equipment), and results in large outputs of failed or low-quality students who have difficulty in finding employment.

It may be noted that foreign aid, by upsetting the educational balance between productive activity and expenditure on education may result in an over-supply of graduates.

The very general implications of this position are that priority will move in stages corresponding to economic growth. In the early stages of development, which include all the South-East Asian countries, there will be a priority to produce relatively small numbers of high-quality secondary and university graduates to start the process of modernization and to replace expatriates; and this minimum must have precedence over primary education if there is competition for resources. In the next stage, when the flow of higher education is established, the economy will take some time to absorb much greater numbers, and the moment has then come for consolidation and expansion of primary education, so that the response to modernizing leadership is more active and intelligent. In the third stage the emphasis will swing back to higher levels as the economy gathers pace towards 'take-off' and the requirements of technicians and technologists begin to rise steeply.

In South-East Asia, Malaysia illustrates well the need for priority to the secondary and especially the university level. A glance at Table 3 shows that Malaysia, with the highest national income per head in the region, has the lowest enrolment per head in universities, save for Cambodia. This is partly due to a perhaps over-stringent selection for entry into the highest levels of secondary education, and partly to a considerable expatriate element in the rubber industry and in Singapore which has delayed the need for Malaysian graduates in the private sector. It is also due, in Malaysia as elsewhere, to weaknesses in secondary education and to language problems. But it has placed Malaysia in a position to expand university education at a high level of quality and has conserved resources for productive investment. In this respect Malaysia is in a unique position in the region.

In contrast, Burma, the Philippines and probably South Viet-Nam are suffering from some over-expansion at the university level and (for the very economic reasons I have given) have had to sacrifice quality for numbers. Indonesia may be running into the same danger. In all these latter cases it would seem that the present decade should be mainly one of consolidation, particularly aimed at the quality of secondary education. Such a policy will in fact increase effective output without increasing initial enrolments since it should reduce the sometimes ruinous failure rates.

Manpower and development strategy

It is impossible to determine the proportion of trained manpower which is required from various educational levels without some close regard to the general strategy of economic development adopted in each country. Moreover, in some degree the existing skills in any country (and those which can be quickly and economically created) should in fact influence the approach to development. Indeed, it may well be argued that this influence should weigh more heavily than has been the case hitherto. In general there has been a marked inclination to model both economic and educational programmes on the contemporary institutions of highly developed countries. In consequence, large and heavily capitalized industries have been established and a tremendous effort has been made to build up heavy enrolments in university institutions.

Historically, however, rapid economic growth was not in the least correlated with large educational enrolments. Harbison and Myers[1] quote that only some 12 per cent of English children were enrolled in elementary schools in 1885 and that compulsory free education to age 14 came only in 1902, long after the main industrial and agricultural revolution. There were only some 33,000 students in all German universities in 1900 and about 240,000 (the same number as in the Philippines) in French universities in 1962 (with double the population of the Philippines and ten times the income per head).

It would, of course, be totally incorrect to infer that South-East Asia today should adopt the nineteenth-century policies of developed countries, since the 1964 technical and economic environment is quite different. But there are substantial and contemporary reasons—and they are primarily in the fields of manpower and skill—why the adoption of the institutional patterns of developed countries (which are the *outcome*, not the *cause* of their development) gives rise to grave difficulties. On the economic side, the establishment of large industrial units, with complex managerial problems, demands just those skills which it is almost impossible to create quickly, since management must be learned mainly through experience and not through academic training. Moreover, it tends to overlook or fail to esteem the skills which *do* exist—skills in running small-scale commerce, in building 'cottage' industry to sizeable proportions, even skills in managing a few acres of land; for however bad may be the techniques of agriculture in the light of modern knowledge, the peasant farmer is usually a shrewd economist within the limits of the techniques he knows.

So also the creation of a complex governmental machine which attempts to direct and co-ordinate the entire economic system puts an enormous strain on the administrative capacity of an often inexperienced civil service. The creation of many new universities demands a supply of teaching staff which is often not available; the prestige surrounding academic attainment downgrades the estimation of the technician and of the practical farmer—the two groups which could probably contribute most to economic advance.

Here again, foreign aid may have a distorting effect, partly by introducing large industrial and other units demanding managerial skills and attitudes not yet locally developed, so that there is danger of collapse when foreign management is withdrawn; secondly by suppressing the growth of native entrepreneurial and managerial skills in smaller units from which a more healthy indigenous growth might have sprung.

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[1] F. Harbison and C. A. Myers, *Education, Manpower and Economic Growth* (New York, McGraw-Hill, 1964).

It may be, therefore, that a development programme more concerned to promote growth from the existing pattern of skills and institutions, rather than to superimpose the 'developed' pattern, might well work better. It is worth putting forward, however tentatively, the manpower and educational implications of such a policy, assuming that its object would be to use the best of modern techniques but in a framework of institutions and skills much closer to the social and economic environment of South-East Asia as it is today.

In the first place, such a programme would require a small but high-quality university output. No country can now afford to lose touch with international standards. This high-quality group would be needed for the planning and manning of the infra-structure, for agricultural research, for the most senior policy-making posts, and for university teaching.

Secondly, it would require a greatly increased manpower supply, less academically and more practically trained, at the post-secondary level. In part this would consist of men and women specifically trained to 'diploma' level, for a profession—agricultural officers, teachers, technicians, health service officers, accountants—in institutions designed for their purpose. In part, however, it might well include a considerable output from colleges, entered after secondary education, and ideally situated in the provinces, which would continue general education but would also involve every student in activities closely linked to economic life, and often rural economic life. Local government, modern agriculture in a dozen aspects, learned on a college farm, practical mechanics, local industry and trade and many other subjects designed to fire the imagination as to possibilities of local development and to equip the graduates in practical ways, could all form part of such college work.

Thirdly, it would involve a gradual consolidation of primary education, again with more emphasis on the environment. It is a frequent illusion that children who have no formal education have no education. In fact they are extensively educated to conform to the local family and economic pattern. It is this that formal education, hand-in-hand with extensive adult education of parents, should seek to supplement and improve, in relation to real conditions of life.

These seem to me to be the essential features of a manpower policy designed to stimulate growth from below on a national scale. It is very far from the policies so narrowly concentrated on the needs and attitudes of an urbanized 'modern sector' which are widely prevalent.

TECHNIQUES OF MANPOWER ASSESSMENT

This is not the place to review the extensive literature on manpower planning. It is enough to record one general conclusion—that none of the methods, however mathematically sophisticated, gives a reliable technique for forecasting detailed requirements in every special field over long periods. The assumptions which have to be made—as to economic growth, alteration of techniques, balance of world trade, political policies, etc., are so enormous that huge possibilities of error are built in before the mathematics start.

Moreover, this report is not and could not be based on enough detailed and accurate information even to feed the right facts into the calculating machine.

In this situation it is clearly wisest to stick to the most general and commonsense approach, with as few technical tricks as possible.

In this report I have made four main assumptions; as follows.

First, in an expanding and modernizing economy with over 60 per cent of the population engaged in agriculture, there will be a need to expand the proportion of manpower with university education or post-secondary training to man the growing modern sector in agriculture, industry, government, education and health services. This 'high-level' manpower will have to expand at a rate faster than the annual rate of growth of national income, while the total employed labour force will tend to expand at a lower rate than GNP. Both these assumptions are based on historical experience.

Second, a proportion of technicians to university graduates of from 3 : 1 to 5 : 1 is a reasonable target. In many developing countries, where university education has been heavily stressed, this proportion has been very low (2 : 1 or even 1 : 2). This assumption is based on the amount of technician or subprofessional support needed by a doctor, a scientist, an engineer, a general manager, a senior administrator.

Third, by assuming differential rates of growth, this proportion, almost always too low at the start, will gradually be widened. Accordingly, in making forward projections, the requirement for men with the highest educational background is assumed to grow about twice as fast as GNP; that for post-secondary trainees at three times that rate. If the highest group is described as Category I and the next as Category II, the model calculation runs as follows:

Category	*Stock, year 1*	*GNP 10-year growth*	*Manpower 10-year growth*	*Wastage on original stock (40 %)*	*Total output required*
		%	%		
I	1 000	50	100	400	1 400
II	3 000	50	150	800	5 300

The stock at year 10 is 2,000 Category I and 5,000 Category II; for simplicity I have used total percentages over a period rather than cumulative annual percentages.

I have dealt with wastage by assuming that after ten years 40 per cent of the original 'stock' will have retired or died (implying a 25-year working life on average).[1] This, of course, will not be literally true: some will still be in post, but some of the new recruits will have been lost, and these two figures are assumed to cancel out. In the model calculation given above, the proportion of Category I to Category II becomes 1 : 3.75 instead of the original 1 : 3. Over twenty years the proportion would become 1 : 4.7. The total stock of Category I plus II would have been more than doubled in ten years and more than quadrupled in twenty years.

Fourth, as a check on the results of this projection in each country I have mentioned the proportion of total high-level manpower to total population, a proportion which varies from as low as 0.1 per cent in very unmodernized economies to 5 per cent or more in, say, the United States of America. In South-East Asia this proportion is at present found in the range 0.2 to over 1 per cent. For most countries I have indicated the proportion to 1975 population which would result from the educational outputs and economic growth projected, running to a top figure of 2 per cent.

The definition of Category I includes technologists and professionals (doctors, for example) who need university training (but not primary teachers); top administrators and managers. The definition for Category II includes the next layer—men and women who have had full secondary education followed by two or more years of vocational training—technicians, radiographers, non-degree teachers, the second level in agricultural extension, business executives below top management or in small firms, fully trained nurses, senior clerks, assistant surveyors, etc. Category III would include craftsmen, junior clerks and cashiers, the third level of extension services, etc. Category IV is unskilled labour and peasant farmers.

There is inevitably some confusion whether Category I refers to the number of *posts* which require university qualifications or the number of *men* who have university qualifications. In countries with a 'surplus' of university graduates (i.e., more than the number of posts requiring such qualification), requirements for Category I have been worked out in terms of posts likely to become available. In 'deficiency' countries, requirements are larger than any number of university graduates that can conceivably be produced in a given time period, and are therefore more often stated in terms of effort to supply some target figure which is still short of optimum requirements.

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[1] The wastage in the whole economy tends to be lower than that for certain individual sectors, since a teacher who becomes a government official is not lost to the economy but is lost to teaching. Where the 'stock' is very young, or where there are few other opportunities of employment, I have occasionally reduced the rate of wastage used.

It will immediately be clear that these are very rough tools of analysis. The test is whether they produce sensible results applied to the particular circumstances of each country. In essence, what I have done in the detailed studies is to look as hard as possible at the real, unique, situation in each country, in qualitative as well as quantitative terms, and to suggest a manpower programme, for certain key sectors, which should roughly match employment opportunity at high levels and should be within the capacity of the educational system. In 'deficiency' countries this target may involve maximum, almost superhuman effort; in 'surplus' countries it will involve a concentration on quality and selection, a task at least equally difficult.

PRINCIPAL GENERAL FINDINGS

In the studies of each country in the second part of this report I have mentioned a large number of individual suggestions and numerical targets, the arguments for which are contained there. There are, however, some more general issues which apply to all, or almost all, countries, and these may perhaps best be listed here.

General-university level. Save in Malaysia, and possibly Cambodia, there is a tendency for total enrolments (but not output) in universities to reach high figures, which might be expected to outrun requirements for high-quality graduates up to 1970, save for teachers and doctors. But there are high wastages, and in some cases a poor-quality final product. The argument is therefore for consolidation, and the manpower targets are set for a minimum production of high-quality graduates.

General-secondary level. There are high wastages in secondary education throughout the region; manpower requirements could be met: (a) if these wastages were substantially reduced; (b) if post-secondary vocational training was massively increased. In Burma and the Philippines, ten years of education from first school entry to university entry is, in my view, inadequate in modern conditions. In both cases extension to twelve years, in line with the rest of the region, might be considered.

Teachers. Throughout the region a major effort is needed to increase the flow of university-trained teachers. This, and the shortage of agricultural staff, are the outstanding deficiencies in the region. Arts faculties in particular could well concentrate far more on supplying teachers; law faculties are almost everywhere over-developed.

Agriculture. Future economic progress depends heavily on agricultural progress. Throughout the region a major effort is needed to train and use effectively a much increased and better qualified field service, backed by more effective and larger research teams and facilities.

Basic science. Concentration on applied technologies—engineering, agriculture, etc., has perhaps obscured the need for a much stronger development of general science faculties. Some very high targets for output of scientists are given in this report, to emphasize the background support and the flexibility for later specialization which are needed behind the field technologists in a developing economy.

General education and practical training. There is a shortage of practical training at post-secondary level. The temptation to substitute vocational education at secondary level should be resisted. The preferable combination is that of good general secondary education (related to environment) followed by thoroughly practical training under realistic conditions. Overseas scholarships might well be much more used for practical attachments rather than for higher degrees.

Distribution. Every effort is needed, by government action and economic incentives, to secure a better flow of trained manpower into rural areas, and if possible to site new education and training institutions outside capital cities.

Quality of secondary education. The secondary system is the foundation for all high-level manpower. Particular effort is needed in the supply and training of teachers, in science teaching and equipment, and in further study of the problem of language of instruction and textbooks.

Proportions. The proportion of manpower with good post-secondary training to that with university degree should be planned to reach 1 : 4 or 1 : 5 over the next decade, within over-all total employment opportunity.

Mobilization for development. It is suggested that future economic progress may depend much on the mobilization and improvement of existing skills throughout South-East Asian societies. This implies more effort to develop agriculture (and small industries associated with it), and the lower and middle layers of commerce in units which do not require high capital investment or high managerial skills. For this purpose the development of middle levels of manpower, of colleges with a rural and applied bias, and of adult education in rural areas would all be of great significance.

THE STUDIES OF INDIVIDUAL COUNTRIES

The studies of individual countries are made up of various elements. There is a brief sketch of the general economic position, and of the ruling aims and attitudes where these are particularly significant. Secondly, a bare outline of key educational statistics, with some comment on any particular feature which will affect the supply of trained manpower. Third, there is some analysis of four main areas of requirement: agricultural staff; engineers, technologists and technicians; doctors; and teachers. Fourth, there is a rough over-all assessment of the present stock of high-level manpower and a projection of desirable growth and possible supply to 1970 and 1975. I regard 1980 as an unwisely distant target for projection because plans can be modified in the 1970's to meet actual conditions—economic, political, social—which are far beyond any worth-while guesses today.

I have not attempted to cost development plans in manpower terms, for two reasons. First, this can only be done by the responsible government which commands the necessary statistics and staff. Second, even such a costing would not result in a manpower budget. Educated manpower is needed to initiate and develop all the activities consequential upon major planned investment—the growth of commerce, the founding of subsidiary industries, social and political leadership. Thus the sum of special, identifiable sectors and plans is always far below the total sum of high-level manpower requirements and opportunities of employment. It is for these reasons that I have used a rate of economic growth as a general criterion against which total needs of higher manpower are inferred. Thus there is built into these estimates an allowance for the general increase in higher education which is not only needed as society develops but which also stimulates growth.

In length, the studies are somewhat out of balance, partly because more information was available for some countries, partly because Malaysia has been treated as four separate studies, in order to look individually at the four components at the date just before their merger.

In general, the estimates and projections are based upon the postulate of continued economic growth; I have assumed success. But they are not aimed at any single theoretical target—for example, any uniform proportion of high-level manpower to total population by 1975. They are aimed at improvement from the actual starting point of 1962; they take into account what seems actually practicable, in educational expansion or economic growth, though often the targets are at the very limits of possible effort. If all the targets were achieved, the effect would be that all South-East Asian countries had advanced, and that the gap between the most and the least advanced had narrowed.

In effect, the result of these individual studies is to emphasize the unique position of each country, partly due to the history of its educational growth and policy, partly to the particular stage of economic advance which has been reached, partly to political philosophy.

Industrial growth

I have made very different assumptions in this field. For example, in Burma the new direction given to the economy by the Revolutionary Government, with a focus mainly on agriculture and with no anxiety to attract foreign entrepreneurs and merchants, is likely to need a few years before Burmese industry starts a new cycle of growth; and in consequence the requirements of graduate engineers have been put at a fairly low level up to 1970. Much higher targets are set for Malaysia, Thailand and the Philippines, where industrialization is gathering speed (particularly in Singapore). In Indonesia only a moderate rate of advance is postulated, because the revival of foreign-currency-earning agricultural production is probably a prior condition for industrial advance. Cambodia is in the very early stages of development, and here again industrial technologists, though urgently needed, are needed only in small numbers. South Viet-Nam presents by far the most difficult problem. The plan envisages very substantial industrial growth, but the foreign currency required to purchase and maintain imported machinery (and imported raw materials) and the purchasing power to buy industrial products is available mainly through massive foreign aid. It is extremely hard to say whether this industrial growth could be sustained under more normal conditions, unless or until agricultural productivity is greatly increased. The estimates for South Viet-Nam are therefore cautious, since it would be easy to create a top-heavy educational structure in relation to the real economic and budgetary resources of the country.

Agriculture

The recommendations for creating a strong agricultural service follow a monotonously similar pattern through each of the national studies. In every case much emphasis is placed on the supporting force of university graduates with a degree in some branch of biology, who should greatly outnumber the field staff (a proportion of three in support to one field officer is suggested). It is probably this output from science faculties which all countries in South-East Asia will find harder to achieve than the comparatively small outputs of field staff at university level. It is at lower levels that the field staff should become really numerous, and where essentially practical training assumes so great an importance.

Very roughly, the following proportionate strength of agricultural staff (including forestry, fishery, veterinary, etc.) is suggested per 10 million of population:

	Degree graduates	*Diploma level*	*Field men*
Field	250	750	2 500
Research and support	750		

Medical services

There is an extremely wide variation in the proportion of doctors to population, and the total figures conceal serious maldistribution. The proportion is better than 1 : 1,000 in Manila, but probably 1 : 30,000 or worse in parts of the rural Philippines. It may be as low as 1 : 50,000 in parts of Burma, and in some parts of rural Thailand, though high in Bangkok. The rate at which progress can be made depends much on the current output of medical schools, since new schools take a long time to create and staff. Table 1 shows the present position and the targets suggested for each country.

Table 1. Medical services: present position and targets

Country	1962		1970		1975	
	Output p.a.	Proportion to population	Output p.a.	Proportion to population	Output p.a.	Proportion to population
Burma	166	1 : 14 000	250	(1 : 10 000)	350	1 : 6 000
Thailand	230	1 : 11 000	300	(1 : 9 000)	500	1 : 7 000
Malaysia	100	1 : 5 500	200	(1 : 5 000)	350	1 : 2 500
Indonesia	(350)	(1 : 50 000)	700	(1 : 22 000)	1 500	1 : 13 500
Philippines	(1 300)[1]	1 : 2 500	850	(1 : 2 500)	(1 000)	(1 : 2 000)
S. Viet-Nam	60	1 : 20 000	150	(1 : 14 000)	250	1 : 8 000
Cambodia	(40)[2]	(1 : 36 000)[2]	(120)[2]	(1 : 10 000)	—	—

1. Not all those granted medical degrees practise, or practise in the Philippines.
2. No full doctors produced in Cambodia until 1963; figures are for *officiers de santé* in 1962, doctors and *officiers* together in 1970.

The significant point in this table is, perhaps, the high rate at which output has to be increased to make any impact on the ratio, owing to the high rate of population growth. The rates for all countries suggested here, except for the Philippines, represent maximum, perhaps even unobtainable rates of increase in the training of doctors, mainly because teaching staff is so hard to find. In Cambodia it is suggested that, in addition to the small but growing output of doctors, *officiers de santé* should be increased at a higher rate, so that a proportion of 1 : 10,000 is reached by 1970. In the Philippines the aim is not to improve the existing ratio at present, but to improve distribution and quality.

Education and teachers

The four tables which follow this section of the report are concentrated upon the survival rates in primary and secondary education and the proportion of students enrolled to population. Table 3 (Primary) shows surprising similarities in the proportion of total enrolments to population, but the proportion of standard I reaching standard VI or VII is notably low in Burma and Thailand. In secondary, the differences widen out, but an especially significant figure is the very low proportion of form 6 enrolments to form 1 enrolments in Malaysia; the gate into the university is exceedingly narrow.[1] Figures between 10 and 20 per cent for the twelfth year against the seventh or eighth year would certainly be more reasonable (Thailand, 13.25 per cent, Indonesia, 19 per cent, South Viet-Nam, 11.4 per cent). Cambodia's university is barely established, so that the low figure there is not as yet significant. To get a reasonable return in manpower from secondary education it is suggested that, in academic streams, about 60 per cent of form 1 entrants should graduate at about the tenth year of education, and half of the remainder, entering the eleventh and twelfth years, should achieve university entrance.

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[1] It is considerably wider if the Chinese streams are considered as available for entry into Nanyang University or a Chinese university overseas.

Once again, it is the supply of teachers for secondary education which is the trouble. I have gone so far as to suggest that arts faculties in universities, while there is a shortage of this acute nature, should regard the production of teachers as their first and overriding responsibility.

Over-all manpower targets

Table 2 below shows roughly the present position and the suggested targets for total manpower in Categories I and II, and the proportions of the high-level force to total population. The university outputs are assumed to supply 80 per cent of Category I. The secondary outputs are taken, where possible, at year 12; in Burma at year 10; in South Viet-Nam and Cambodia at the first *baccalauréat*. No 1962 figures are given for the Philippines, because it is impossible to know the quality of the output. The 1970 figures are based on a calculation (in the country study) of the number of 'high-quality' graduates from universities and from the twelfth year of education respectively who might be needed to man the Philippine economy.

TABLE 2. Manpower in Categories I and II: present position and suggested targets

Country	1962				1970			
	Stock	Output p.a.		Stock population %	Stock	Output p.a.		Stock population %
		University	Secondary			University	Secondary[1]	
Burma	60-80 000	2 260	(8 000)	0.26-0.35	165 000[2]	4 000	15 000	0.6(1972)
Thailand	100 000	2 900	12 000	0.35	256 000	4 500	31 000	0.7
Malaysia	130 000	1 000	12 000	1.38	274 000	3 500	25 000	2.0
Indonesia	440 000	(2 750)	50 000	0.45	1 100 000	9 500	120 000	0.9
Philippines[3]	—	—	—	—	650 000[3]	5 500[3]	20 000[3]	1.7[3]
S. Viet-Nam[4]	—	(500)	(7 500)[4]	—	—	—	—	—
Cambodia[5]	—	(50)	(550)[5]	—	—	—	—	—

1. Additional to university entrants.
2. Assuming 80,000 stock in 1962.
3. 'High-quality' graduates of university and twelfth-year secondary graduates.
4. First *baccalauréat*.
5. Second *baccalauréat*.

Some further projections, particularly of university outputs required by 1975, have been made for some countries (Malaysia, Thailand, Indonesia in particular) for certain special classes of manpower.

These figures must be regarded with caution by the administrator—they would certainly appal the statistician, since they are often based on very rough approximations. But they set certain orders of magnitude. They are, in one sense, fairly conservative: if economic progress is maintained, they would not, I believe, involve any country in serious over-production at university or secondary level. In another sense the university targets for doctors and teachers are high in relation to existing faculties and possibilities of expansion. Malaysia will still be short of university graduates in 1970 and should need a total university enrolment of over 20,000 by 1975 in five or six university institutions. Burma, the Philippines and Indonesia will all have a tremendous task in building firm standards of quality; Thailand in building up two new university institutions; Cambodia in consolidating the great leap forward of the last five years and establishing a single, strongly-led university. I believe, however, that no lesser targets would satisfy the determination of South-East Asia to strengthen the force of educated men and women who must provide leadership in the following decade.

TABLE 3. Primary education, 1962

Country and 1962 population (millions)	Total enrolments (000s)				Enrolments by grade (000s)			
	I-IV	V-VII	Total	Percentage of pop.	I	IV	VI or VII	VI/VII as percentage of I
Burma	1 602.3	176.0						
(23.0)	(100)[1]	(40)[1]						
	1 702	216	1 918	8.3	952[2]	150[2]	45[2]	2.6
Thailand	3 388.4	194.5						
(28.8)	328.6[1]	181.5[1]						
	3 717.0	376.0	4 093.0	14.2	1 322.9	657.3	112.7	8.5
Malaysia (10.5)								
Malaya (7.5)	I-VI		1 133.3	15.0	223.6	—	173.1	77.4
Singapore[3] (1.7)	I-VI		308.0	18.0	56.2	—	39.2	70.0
Sarawak (0.78)	I-VI		99.7	9.5	19.8	—	11.1	56.1
Sabah (0.48)	I-VI		58.0	12.0	17.1	—	4.2	24.5
Total	I-VI		1 599.0	15.2	316.7	—	227.6	73.2
Indonesia (99.4)	I-VI		9 500	10.0	(1 178)	—	530.2	45
Cambodia (5.7)	I-VI		590.4	10.4	166.1	59.6	44.1	27
South Viet-Nam			1 174		364.5		140.3	(V)
(14.8)	I-V		276.7[1]	9.8	116.2[1]	—	28.6[1]	35
			1 450.7		480.6		168.9	
Philippines			(I-VI)					
(29)			4 226 8		969.0	635.2	367.9	
	(I-IV)	V-VI	212.1[1]		45.8[1]	28.6[1]	24.8[1]	
	3411.7	1 027.2	4 438.9	13.0	1 014.6	663.8	392.7	38.7

1. Private. Figures in parentheses indicate estimates.
2. State schools only.
3. 1961 education figures.

TABLE 4. General secondary education, 1962

Country and population (millions)	Total enrolments (000s)				Enrolments by form (year) (000s)		
	Years	Years	Total	Per 100 000	Form 1	Form 3, 4 or 5	Final form (and as percentage of form 1)
Burma	(8-9)	(10)			(8)	(9)	(10)
(23.0)	76.8						
	25.0[1]						
	101.8	8.0	109.8	477	(55)	(45)	8 (18 %)
Thailand[2]	(8-10)	(11-12)			(8)	(10)	(12)
(28.8)	133.7	15.3					
	102.5[1]	19.2[1]					
	236.2	34.5	270.7		93.7	66.5	12.4 (13.25 %)
			287.0[3]	997[3]			
Malaysia (10.5)	(7-11)	(12-13)			(7)	(11)	(13)
Malaya (7.5)	200.25	2.1	202.4	2 700	56.9	14.8	0.99 (1.7 %)
Singapore (1.7)	66.5	1.1	67.6	3 965	18.3	11.1	0.48 (2.6 %)
Sarawak (0.78)	14.3	0.5	14.8	1 900	4.8	0.96	0.5 (11 %)
Sabah (0.48)	5.4	0.13	5.5	1 115	2.1	0.5	0.13 (6 %)
Total	286.45	3.83	290.3	2 765	82.1	27.4	2.1 (2.6 %)
Indonesia[4]	(7-9)	(10-11)			(7)	(9)	(12)
(99.4)	448.0	137.3	585.3	617+	179.2	124.4	34.0 (19 %)
Cambodia[5]	(7-10)	(11-13)			(7)	(10)	(13)
(5.7)	44.9	2.1	47.0	824	18.5	6.95	0.23 (1.3 %)
South Viet-Nam	(6-9)	(10-12)			(6)	(9)	(12)
(14.8)			98.7		22.1	13.3	
			163.5[1]		51.1[1]	30.1[1]	
	209.2	53.0	262.2	1 772	73.2	43.4	8.3 (11.4 %)
Philippines[6]	(7-10)				(7)	(10)	
(29.0)			249.9		87.5	41.7	
			417.6[1]		140.7	73.2	
			663.5	2 288	228.2	114.9	

1. Private schools.
2. 1961 education figures.
3. 1962 total and proportion.
4. 1960/61 education figures. The proportion per 100,000 is on the 1960 population (94.8 million).
5. 1961/62 education figures.
6. 1961 education figures.

TABLE 5. Universities, 1962

Country and population (millions)	Total enrolled	Arts		Science		Medical		Engineers		Agriculture veterinary, forestry		Graduates	
		Enrolled	Graduates	Enrolled	Graduates	Enrolled	Graduates	Enrolled	Graduates	Enrolled	Graduates	Total no.	Percentage of enrolment
Burma (23.0)	16 095	5 531	(700)	3 369	(495)	1 463	166	671	111	122	35	2 261	14
Thailand (28.8)	17 000	8 000[1]	1 651	1 717	200	3 150[2]	392	1 350	200	2 101	241	2 889	16.4
Malaysia													
Malaya (7.5)	1 331	714	145	317	70	100[3]	—	225	21	75	7	240	18
Singapore (1.7)	4 259[4]	1 310	—	1 130		820	95	—	—		—	741	17.4
Total	5 590											981	17.5
Indonesia (99.4)	90 000	(13 400)	(250)	(6 450)	(300)	(9 350)	(520)	(2 000)	(300)	(2 450)	(150)	(2 850)	3
Cambodia (5.7)	1 450	707	(15)	110		416[5]	12	?		—	—	?	?
South Viet-Nam (14.8)	16 553	3 675	?	3 383	(45)	1 233	95[6]	300	(70)	176	(40)	(510)	3
Philippines (29.0)	234 167[7]												

Note. Figures in brackets indicate estimates.

1. Allows 5,000 full-time to Thammasart, from about 30,000 registered.
2. 3,150 included sub-professional. Output of graduates approximately 250 doctors, 150 others.
3. 55 medical, 25 dental, 20 pharmacy.
4. Includes Nanyang. University of Singapore figures are total enrolled 2,149; total graduates 336.
5. Includes health officers.
6. Includes 20 pharmacy, 15 dentistry.
7. University of the Philippines 16,674. Private universities 217,488.

TABLE 6. General indices, 1962

Country and population (millions)	National income per head (£)	Primary pupils per 100 000	Secondary pupils per 100 000	University students per 100 000	Doctors	Organized manufacturing employees	Agriculture (% occupied)
Burma (23.0)	23	0 340	477	70	1 : 14 000	140 000	62.9+
Thailand (28.8)	37	14 200	997	59[1]	1 : 11 000	(150 000)	82.0
Malaysia (10.5)							
Malaya (7.5)	93	15 000	2 700	17.7	1 : 7 000	145 000	62
Singapore (1.7)	175	18 000	3 965	250.0	1 : 2 500	80 000[2]	8.5
Sarawak (0.78)	69	9 500	1 900	—	1 : 13 400	10 000[3]	81.3
Sabah (0.48)	75	12 000	1 115	—	1 : 10 200	6 940[3]	80.5
Total	100	15 200	2 765	53	1 : 5 500	240 000	55
Indonesia (99.4)	(15)	10 000	617	90.5	1 : 50 000	(400 000)	71.9
Cambodia (5.4)	(30)	10 400	824	27	1 : 36 000[4]	(?)	(80+)
South Viet-Nam (14.8)	(30)	9 800	1 772	111.5	1 : 20 000	(30 000)	(78)
Philippines (29.0)	46[5]	13 000	2 288	807	(1 : 2 500)	(200 000)	61.7

Note. Figures in parentheses indicate estimates.

1. Allows 5,000 to Thammasart.
2. 66,000 in 1960. It has certainly risen sharply.
3. Labour force in manufacturing: the organized manufacturing figure would be much lower.
4. Includes *officiers de santé*; without them 1 : 150,000 1961.
5. 1953/54.

Individual studies

Burma

INTRODUCTORY NOTE

The following estimate of manpower requirements in Burma has necessarily been written without the possibility of reference to a forward development plan. The 1962 Four-Year Plan was suspended by the Revolutionary Government in 1963, in order to prepare a new plan more in keeping with the objectives of Burmese socialism; the many key decisions had not yet been made at the time of this manpower inquiry. Accordingly, I have endeavoured to suggest the kind of manpower proposals which would be consonant with the new ideals in Burma.

The Revolutionary Government is faced with many difficulties and disappointments arising from the period before it came into power. The shape of the Burmese economy in colonial times was based on the development of rice, teak and mineral exports under expatriate management, with little effect in diversifying and modernizing the economy as a whole. In the endeavour to alter this, the industrialization programme of the 1950s, on models borrowed from developed countries, ran into many difficulties. No doubt this was partly because it involved a complexity of planning, managerial and administrative organization which was not developed in Burma. Moreover, in some notable cases, design or materials provided by foreign aid proved faulty.

The present government, in turning away both from foreign private investment in industry, partly because of this experience, and from private merchanting in Burma, partly because so much capital was remitted overseas, is giving an entirely new direction to the economy and to society. Its aims are to mobilize the indigenous energies and skills of the peoples of the Union, with especial emphasis on the improvement of agriculture and the development of the whole standard of rural life. Governmental enterprise, extensive use of co-operatives, and stimulation of local self-help and self-reliance all play a large part in this programme; it has been emphasized that 'the Burmese way to socialism' is not merely socialist but an expression of Burmese nationalism.

The full implications of this policy are not yet visible, nor can the present difficulties of Burma be regarded as indications of lack of success; they are in part inherited, in part the difficulties of abrupt transition. It is clear that manpower policy will be as deeply affected as are all other parts of the economy; and that an emphasis on practical mass education, on the improvement of skills and training at lower and middle levels, rather than in academic studies, is probable, quite possibly associated with 'crash' programmes of training at the top level to meet urgent administrative and technical needs. It is on these assumptions that this report is based.

THE ECONOMY

Burma is an agricultural country primarily dependent upon rice and forestry. But there is sufficient variation in climate from the Irrawady delta through the dry zone to the mountains, to allow great diversification of crops. Mineral resources, including precious stones and oil, are partly developed but may yet prove more important. Perhaps the two greatest needs are the development of road communications in the hills and a measure of national unification which would include the Karens, Shans, Kachins and other minority peoples into a single patriotism for the Union of Burma.

For a number of reasons, among which domestic insecurity must be rated high, the economy of Burma has grown only slowly since the war.

	1939	*1956/57*	*1959/60*	*1961/62*	*1962/63*
Gross domestic product[1] (K millions) (constant 1947 prices)	4 945	4 934	5 600	5 544	5 999
Index of output (*per capita*)	100	83	89	86	92
Index of consumption (*per capita*)	100	87	89	86	90
Agricultural production	97	80	87	86	110

The indicators for 1959/60, 1960/61 and 1961/62 remained virtually level; the estimates for 1962/63, however, show a quite sharp rise. Gross domestic product, which regained its pre-war level only in 1956/57, has risen by 21.6 per cent in the six years to 1962/63. This has barely sufficed to keep pace with population increase. Income per head stands at about £23 per annum, on an estimated population of 23 million in 1962/63. Estimates of future population suggest figures of 23.5 million in 1965 and 26 million in 1970.

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[1] Figures from *Economic Survey of Burma*, 1963.

In financial terms the economy is quite well placed for future growth. The foreign trade balance, heavily adverse in 1960/61 on current account, was equally favourable in 1961/62, and there was a considerable rise in foreign exchange reserves. This change was mainly due to an increase in rice exports and a fairly severe restriction of imported consumption goods. Estimates for capital resources available for 1963/64 stand at K.874 million, against K.672 million in 1962/63.[1]

The continued and increasing shortage of imported consumer goods, when matched against the huge increase in government loans to agricultural producers, must give some anxiety; but it had not resulted in any serious inflation by 1963.

Prospects for increasing physical output, subject to one vital condition, are also good in the agricultural sector, but still limited in industry. The condition relates to the efficiency of administration and management, and is dealt with later.

In the *agricultural* sector the main advances are foreseen in diversification of crops, improving yields by seed selection and fertilizers, mechanization and irrigation, with some further increase in cultivated acreages. In 1961/62 the most notable gains were in cotton (long-staple varieties are being introduced) and ground-nuts; a good deal of effort is being put into sugar-cane, jute and kenaf, which may show results. On the other hand, despite an increase in acreage, paddy yields in 1961/62 were disappointing and there is little sign of any major advance in productivity. Estimates for 1962/63 show a rise of 10 per cent in paddy production (7,289,000 tons) which is encouraging, although still 2 per cent below pre-war production. There was an increase of 5 per cent in sown acreages. Government loans to farmers have been steeply increased, but this is in part a substitute for the credit previously given by private merchants and millers. Total loans by the State Agricultural Bank, Department of Agriculture and the Agricultural and Rural Development Corporation (ARDC) for 1961/62 stood at K.273.56 million, increasing to K.568.1 million in 1962/63 and planned to increase to no less than K.994 million in 1963/64.[2] The mechanization programme, which is to be stepped up to use 3,500 tractors, has run into severe difficulties owing first to a shortage of tractor-drivers and then to insufficient training of drivers and mechanics. Tractor use has been put as low as 300-600 hours per year against 2,000 hours in Thailand.[3] Major new irrigation work is mainly in the planning stage, and it will be from three to five years before new irrigated acreages will be available on a really large scale.

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1. Figures from *Economic Survey of Burma*, 1963.
2. *Economic Survey of Burma*, 1963.
3. Estimates by Massey-Ferguson.

Provision of *electric power*, adequate for present needs, is increasing only slowly; if the economy were to develop as fast as the Government hopes, a shortage of power could develop. The hydro-electric (Baluchaung) station in 1962/63 generated 214 million kWh out of 336 million kWh. The next major source would be the Mobye Dam (Baluchaung River) with a proposed installed capacity of 84,000 kW, but this is still in the planning stage. The price of power is still relatively high.

In the *industrial sector* the new cement plant has increased total output to an estimated 107,476 tons in 1962/63, against 33,695 in 1961/62,[1] and there are satisfactory rises in sugar production (60,000 tons against 42,400 in 1960/61),[1] and in cotton yarn. There are plans to add another 120,000 tons of cement-making capacity and also four new textile mills in the cotton belt.[1] The steel plant, however, has had an unsatisfactory history and has still not fully overcome its major difficulties. Plans for future industrial development include a pulp and paper factory, a fertilizer plant (urea), a tyre factory and an extension of plywood manufacture. The Krupp Survey for a possible iron and steel complex has not yet resulted in specific plans.

Finally, *transport and communications* are a weak spot in the Burmese economy. The road network is too small to carry any great growth in rural economic life. Despite improvements in rail and water transport and in passenger air service, this is a major handicap which may need extensive investment over the next ten years.

GENERAL SOCIAL-ECONOMIC SITUATION AND PROSPECTS

These bare facts about the economy do not adequately illuminate the situation in Burma today. They show considerable economic possibilities, above all in the potential wealth of Burma's land; and they show a new and energetic start in agricultural development, which is of supreme importance. But they omit the all-important revolution in approach to the economy and to society initiated by the Revolutionary Government of the Union. The Government has made itself responsible for all new industry, for banking and most import-export business, and for the whole agricultural economy, including the purchase and marketing of the rice crop. Almost the whole burden of top administration and management in the entire economy has been put upon the shoulders of the armed forces, which to a large extent direct the civil administration or themselves undertake management functions. International aid is on a government-to-government basis and there is no place for private foreign investment.

The Government has set itself to generate energy and enthusiasm among the whole people, partly through the creation of a party (still deliberately limited in numbers) and by the system of security and administration committees, under army leadership, running from the centre right down to districts, townships and villages. The educational system, from primary school to university level, is under review and may well be directed towards a far more applied and practical character with emphasis on 'livelihood' and technical training.

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[1] *Economic Survey of Burma*, 1963.

The imposition of these policies, 'the Burmese way to socialism', has inevitably antagonized sections of the civil service, of the university students and of the commercial middle class, three groups which included a high proportion of the most educated citizens of Burma. At the time of this inquiry (1963/64) a major reorientation both of organization and attitude was in process in Burma, and in many fields major new policy decisions were still under consideration. It was clear, however, that the Government was faced by an immense burden of administration and management in every field; that it would need to win the co-operation of the best-trained cadres in the whole country in a new approach to administration and to economic policy; and that extensive new training and re-training of manpower will be needed to meet new administrative tasks (for example, rice purchasing) and new social programmes, in particular the invigoration and uplifting of the whole level of peasant life and productivity. Manpower policy must take the fullest account of this situation, since its task is to devise a programme of education and training which coincides with and fulfils the basic policies of the Government.

While it is clear that, with the assistance of international aid, certain major enterprises are in view which require highly trained technologists (hydro-electricity and irrigation in particular), the major effort in economic advance lies in the improvement of productivity in peasant agriculture, in the industries processing agricultural products, in road communications and in the marketing, commercial and distributive systems associated with the agricultural economy. In manpower terms, the need will be for the development of administrative and managerial skills, both at the top level whence the economy is directed, and, in massive strength, at the middle and lower levels where co-operatives, agricultural extension, community development, marketing and communications will demand an army of competent and energetic staff. Other notable requirements will be in agricultural research (in the widest sense, including research on the design and management of irrigation) and in the creation of a force of middle-level technicians both for the agricultural sector and for new small industry. Such a manpower policy has direct implications in the field of general and vocational education and in training policy.

THE EDUCATIONAL SYSTEM

Enrolments in State schools for 1962/63 are given in Table 7.[1] Private school enrolments were not available for the same year, but a very rough estimate is given in the table, based on 1959/60 figures for registered private schools.

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[1] *Economic Survey of Burma*, 1963.

TABLE 7. Enrolments in State and private schools

Level	State schools	Registered private schools[1]	Rounded totals (pupils)
Primary (I-IV)			
Schools	12 718	222	
Pupils	1 602 261	(100 000)	1 700 000
Teachers	37 719		
Middle (V-VII)			
Schools	548	215	
Pupils	176 024	(40 000)	216 000
Teachers	6 047		
High school (VIII-X)			
Schools	281	(382)	
Pupils	76 813	(25 000)	102 000
Teachers	2 553		

[1] 1959/60 figures were: primary, 137 and 82,000; middle, 141 and 29,786; high, 267 and 20,544. The number of registered private schools is for 1962 (AID figures) but enrolments are not available.

The State primary system is characterized by an enormous enrolment in standard I—about 950,000,[1] dropping to 270,000 in standard II and 150,000 in standard IV. Thus a very small proportion of Burmese children ever complete four years of primary education, perhaps 180,000 per year if private schools are included. From this point onwards the fallout is far less; probably at least 80,000 enter middle schools and nearly 50,000 go on to high schools. The numbers taking the high school final examination at year IX each year had risen to over 70,000 by 1961, including presumably a large number of 'private' candidates and repeaters from outside the regular school system. About 8,000 were enrolled in the State school year X (matriculation year) in 1962/63,[2] and in that year 13,143 took the matriculation examination and 3,131 passed[3] (about 3,000 candidates from private schools must have been included).

These figures show that the education system, in so far as it is effective in bringing children through to higher education, is really quite small. It is based on 180,000 leavers from primary IV, about 70,000 leavers from middle VII, and about 50,000 leavers from high school IX, of whom about 15,000 stay to standard X to take matriculation, which 3,500 pass—i.e., about 2 per cent of those who complete primary IV. The colossal wastage is, of course, the loss of 750,000 children between primary I and II. Manpower implications of this state of affairs will be dealt with later.

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[1] 71 per cent of the 6-9 age group: but 52 per cent in fact drawn from higher age groups.
[2] Unesco National Commission.
[3] Ministry of Education, Burma.

At the university level, the broad picture as at 1962/63 is that about 3,500 passed matriculation for entry; about 16,000 students form the total enrolment in Rangoon University, with its branches, and Mandalay; and about 2,000 students were successfully completing courses entered four or more years before. The examination results for 1962 show: *arts and science* (B.A.), 1,145; *engineering* (four years post-intermediate 'B'), 111; *agriculture* (four years post-intermediate 'B'), 16; *forestry* (three years post-intermediate 'B'), 19; *medicine* (five years post-intermediate 'B'), 166; *education:* B.A. (Ed.), 238; diploma (one year post-B.A.), 256; B. (Ed.) (one year post-diploma or B.A. (Ed.), 85; *law* (two years post-B.A.), 99; *B. Com.* (four-year course), 126; total 2,261. It will be more convenient to deal with the state of technical education in connexion with the demand for technical manpower.

THE EXISTING MANPOWER SITUATION

The industrial distribution of the working population for 1953/54 is given as follows:[1] agriculture, 62.9 per cent; industry and mining, 10.0; trade, 10.6; services, 4.4; transport, 2.4; miscellaneous, 9.7. These figures are projected from the 1953 census which covered the bulk of the urban population but only 15 per cent of the rural population, i.e., 30 per cent of the total population in all. A series of complex assumptions has led the Census Department to assume a population of 23.7 million in 1963. A more conservative United Nations estimate puts the population at 23.53 million by 1965. I have adopted a round figure of 23 million in 1962/63 for purposes of calculating educational enrolments per 100,000 of population and national income per head.

Revised figures of occupational structure (1963)[2] give 72 per cent of the rural working force in farming, hunting, fishing and related occupations, 10 per cent in services, 8 per cent in rural industries and crafts, 7 per cent in sales and related occupations. The total labour force (on a basis of 23.7 million population) is estimated at 9.5 million (1.26 urban, 8.28 rural).

The number employed in manufacturing industry employing ten or more persons is given as 140,175 in 1960/61.[2] The 1953 census suggests a figure for professional, technical and related workers of less than 1 per cent in rural areas (about 80,000 in 1963) and less than 4 per cent in urban areas (about 40,000 in 1963). These figures do not correspond to Categories I and II for manpower calculations since a very humble definition of 'technical' is used, and further, all primary school-teachers, however unqualified, are classed as 'professional'. Figures for total numbers of high-school final passes and total number of university degrees granted since 1946 and up to 1963 indicate that roughly 51,000 passed the high-school final and roughly 15,500 degrees were given.[1] It may be that the total 'high-level' manpower generated since the war would be: university graduates (B.A., B.Sc., professional and higher degrees), 15,500; passed intermediate (two years at university), 15,000; passed high-school final but did not enter university, 20,000; total 50,000.

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[1] Second Four-Year Plan, 1962.
[2] *Economic Survey of Burma*, 1963.

It is clear from investigations undertaken, with ILO assistance, between 1962 and 1964, that this existing stock of higher manpower is badly adjusted to the actual needs of the economy in a number of ways:

1. There was in 1962 and 1963 a 'surplus' of university graduates—that is to say, considerable numbers (up to 40 per cent in some mechanical and electrical branches of engineering) of newly graduated students were unable to find employment in the type of work for which they felt themselves qualified. Similarly, there was a 'surplus' of graduates from the technical institutes, of about 20 per cent, and even unemployment from the trade schools. To a large extent this surplus was due to the failure of the plans for industrialization to develop satisfactorily between 1951 and 1958.
2. The proportions of various levels of training have been wrong. The tendency has been to produce too low a proportion of craftsmen to technicians and of technicians to university graduates, so that the pyramid of skills is virtually inverted.
3. Despite the apparent over-all 'surplus', there are shortages in certain fields, particularly in certain technical and supervisory posts. The chief shortages in industry have been identified as laboratory technicians, draughtsmen, sawyers, moulders, machine-tool setters, construction machine operators, toolmakers, annealers, temperers, machine maintenance and repair men, sheet-metal workers, welders, flame-cutters. In many cases the jobs were in fact filled, but by inadequately trained operators.
4. There are, moreover, very real but undeclared shortages of trained staff in other fields. The force available for technical advice is far too small to meet the Government's aims of agricultural advance. Again, a proportion of one doctor to 14,000 population represents clearly an over-all shortage, over and above the maldistribution of doctors as between Rangoon and the provinces.
5. There [illegible] 500 foreign technicians in Burma.[2] Their presence does not necessarily imply a shortage of the kind of manpower Burma could economically produce, because many are specialists in a narrow field; but clearly some of them should be replaced by Burmese in due course, provided that a proper effort to train counterparts is being made.
6. Now that the Government has taken over further sections of the economy, and has initiated new organizations (for example, co-operatives), there is

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1. ILO.
2. Unesco/IAU.

a considerable shortage of managerial, administrative and organizing skills, perhaps especially at the middle and lower levels. The filling of these posts is not necessarily so much a question of increasing the output from education as of providing practical training on a larger scale and with a more thorough content.

These observations, taken together, imply: (a) A maldistribution of higher manpower in three ways: (i) geographically, (ii) as between levels of skills (artisan/technician/university graduate), and (iii) as between types of skill. (b) A real shortage in certain skills (doctors, agricultural advisory and research staff, industrial technicians). (c) The need for much more emphasis on practical training of the existing output from schools and colleges rather than for merely expanding that output. In a Burmese socialist society, in which the Government undertakes directly so many economic, industrial and agricultural functions, the need for administrative and managerial training is bound to be acute. (d) In addition to these issues of distribution, numbers and practical training, the quality of the educational system itself will need review. (e) It might be helpful for the Government to establish a vocational guidance system.

MANPOWER REQUIREMENTS

General

I have suggested in the General Report that only the roughest relationship can be assumed between rates of economic growth and requirements of high-level manpower; these relationships must be modified in accordance with the particular type of economic growth foreseen in any particular country.

In the Union of Burma it is reasonable to anticipate that most economic growth over the next five years will come from improvements in peasant agriculture, and that substantial industrial growth will be delayed until nearer the end of the decade. It would follow that immediate manpower needs are likely to relate mainly to agricultural research, advisory and extension services, to rural administration and marketing, to civil and agricultural engineering on 'infra-structure' projects, and to education. The production of skills for heavy industry can proceed at a slower pace.

To reach an over-all target for higher manpower for the next ten years, the following assumptions may be made, on two alternative economic growth rates:

Total ten-year growth in GNP as percentage of 1962:
Lower: 40 per cent (3 ½ % per annum cumulative);
Higher: 55 per cent (4 ½ % per annum cumulative).
Required growth of Category I manpower:
Lower: low economic growth × 1 ½ = 60 per cent;
Higher: high economic growth × 2 = 110 per cent.

Required growth of Category II manpower:
Lower: low economic growth × 2½ = 100 per cent;
Higher: high economic growth × 3 = 165 per cent.

If the total higher manpower stock in 1962 is taken as Category I, 20,000[1] and Category II, 40,000,[1] and if wastage by death, retirement, emigration is taken as 40 per cent over ten years (i.e., an average working life of 25 years), the ten-year total manpower requirements would work out as shown in Table 8.

TABLE 8. Ten-year total manpower requirements

Category	Stock 1962	Wastage (40 per cent)	Growth required		Ten-year output required	
			Lower	Higher	Lower	Higher
I	20 000	8 000	12 000	22 000	20 000	30 000
II (a)	40 000	16 000	40 000	64 000	56 000	80 000
(b)	60 000	24 000		99 000		123 000

The higher level of output would give a stock of high-level manpower in 1972 of 42,000 Category I and 104,000 Category II, a total of 146,000. The present estimated total of 60,000 high-level manpower from a population of 23 million gives a proportion of 0.26 per cent. The higher rate of growth, to 146,000 on a 1972 population of 27 million, would give a proportion of 0.54, which would be much more satisfactory. The higher rate implies an average production of 3,000 Category I (mainly university graduates) manpower per year over ten years and of 8,000 Category II (post-secondary with three years' training) manpower per year. I am inclined to think that the Category II stock has been estimated too low, and that a figure of 60,000 would be nearer, implying an output of 12,300 per annum. This would imply an annual university output of graduates rising from 2,200 in 1962 to almost 4,000 in 1972, and of post-secondary training to about 15,000 per annum in 1972. The necessary high-school output would be a minimum of 8,000-10,000 matriculants per annum, plus another 8,000-10,000 entering post-secondary training; of the 10,000 matriculants, perhaps 4,000 would take degrees and the remainder would enter Category II jobs. The total outputs would be: Category I, 4,000; Category II, 14,000-16,000. As will be seen, these outputs are well within the range of the existing educational system, but beyond the present capacity of training institutions with post-high school entry. In particular, far too many students leave at standard IX, after only two years of secondary education, and receive no formal training.

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[1] Total high-school passes post-war = 50,000. Add 10,000 for 'stock' remaining from earlier years. But many Category II posts might be held by men who did not complete high school, and I have therefore suggested later a higher figure for Category II (60,000)—see Table 8.

These targets may appear somewhat modest. But to maintain 4.5 per cent per annum cumulative economic growth over ten years, through occasional bad seasons or low export prices, will be no mean achievement. On the manpower side, the target implies more than doubling the stock and doubling the proportion of higher manpower to population, which would become 0.54 if the higher figure of 60,000 Category II stock in 1962 is used.

Agricultural manpower

The future of Burmese agriculture is full of hopeful possibilities. Already the introduction of long-staple cotton is succeeding (about 160,000 acres had been planted to cotton in 1963), and there are good hopes for other crops—groundnuts, jute and kenaf, sugar, etc. Double-cropping with the aid of tractor ploughing, more irrigation in the drier areas and the development of animal husbandry could both diversify and increase total output, quite apart from increasing rice production per acre. But to achieve these targets three factors are vital: incentives to the farmers, strong advisory and educational services to the farmers, and a large programme of research.

Incentives inevitably play a major part in manpower policy, both to distribute staff to the occupations where they are needed and to ensure that research and advisory services are not stultified by economic factors which discourage adoption of new methods and the harder work which they imply. While the Government has given much aid in credit, fertilizer distribution and improved seed to farmers, it is still paying very low prices for rice and very small differentials for better-quality rice. The rate per basket is about 3 kyats in Burma, the equivalent of 5 kyats in Thailand and almost 12 in Ceylon. The differential for high-quality rice (which involves work in culling rogue plants, in grading, etc.) was in 1963 only 25 kyats per 100 baskets.[1] Further, at these prices, 1 kyat spent on fertilizer may not yield more than 1.25 kyats in crop sales. There is at least a strong *prima facie* case for arguing that the low yields of Burmese paddy production are mainly due to inadequate cash incentives to farmers.

The advisory services are also extremely thin on the ground compared with many other countries. This is not altogether due to a shortfall in the output from education; the Faculty of Agriculture in Mandalay produces about 25 graduates per annum, which should eventually maintain a force of just over 600 (4 per cent per annum wastage is assumed). The Agricultural Institute of Pyinmina produces about 60 diploma graduates per annum, which would maintain a force of 1,500 in the field. But in recent years the

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[1] K.335 against K.310 per 100 baskets of 46 pounds.

Government has not been willing to create the posts to employ this output; in January 1964, despite the new programmes, the Ministry of Agriculture reckoned that about 20 graduates, 40 diplomates and 350 field men were unemployed. Many graduates in earlier years failed to find agricultural work and drifted into other occupations. The present field force (excluding research) is probably not much over 60 graduates and 200 diplomates.[1]

It is understood that existing plans will allow for one graduate to each township area (about 300). A reasonable level for the future might be: 600 graduates (300 field advisory and administrative, 100 agricultural and irrigation engineers, 100 for research, crop and animal husbandry, and field; 100 for co-operatives, credit, marketing); 1,500 diplomates; 300 inspectors; 3,000 field men;[2] 500 other agricultural research assistants. This would bring up the field and field research force to approximately the level of East Africa (Kenya, Uganda, Tanganyika: total population about 22.5 million). At least a quarter of the graduates should have post-graduate experience and some period of training or experience outside Burma. A good deal more attention to training agricultural (not veterinary) staff in animal husbandry will probably be needed.

This does not imply a great expansion of output at the high level—about 40 graduates, 100 diplomates and 300 field men per year would build up to the required force in less than ten years. It does, however, require more practical training, with a higher element of farm work in it; more post-graduate scholarships, and the extension of the present training of field men from six months to at least eighteen months, of which a good proportion should be in practical conditions.

These figures have dealt almost wholly with the field force of agricultural officers and applied research staff. But behind them must be a considerable army of scientists concerned with more basic research and planning. These would include botanists, zoologists, entomologists, soil physicists and chemists, hydrologists, mechanical engineers, plant breeders and plant pathologists. It is not enough that the universities should produce these scientists at bachelor-degree level: a considerable effort of planning and organization is needed both to arrange post-graduate work for them and to absorb them into research and teaching organizations where their knowledge can be developed and used. The particular type of post-graduate specialization can be decided as time goes on and needs become manifest. The proportion of science graduates who will be concerned with the whole agricultural industry to field staff could well be as high as 3 to 1.

The creation of a first-rate scientific and field advisory staff for agriculture over the next ten years, backed by laboratories and post-graduate work, and extended to forestry, fisheries, animal husbandry, water resources and irrigation, mechanization, plant breeding, pest control and agricultural processing, could well be the highest priority in the planning of manpower and of university and diploma-level institutions. It is probable that no other single investment could do so much to increase economic progress and raise living standards.

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[1] FAO estimate, 1963.

[2] The targets are: one field man to five villages (there are 15,000 villages); and one inspector to ten field men.

Technologists and technicians

Burma suffers in the most acute form from the lack of sufficient industry and large-scale commercial enterprise in which to train industrial and commercial managers and technicians. This is an inevitable penalty of nationalization, for much valuable industrial training in other countries is provided by expatriate firms, which frequently will send young managers overseas as well as giving them experience on the spot. While the technical skills can (though with difficulty) be built up in full-time training institutions, managerial and commercial ability cannot be built up in classrooms and laboratories. All that follows on technical training is qualified by this need for practical working experience; it may have to be gained overseas in some cases.

Output from government technical training can be set out fairly simply by levels of entry, as follows.

	Course (years)	*Output*
Post-standard IV:		
1 handicraft training centre, Rangoon	1	75
2 agricultural middle schools	3	70 (?)
2 trade schools (Rangoon and Mandalay)	3	120
Post-standard VII:		
1 technical high school (Rangoon)	3	120
2 agricultural high schools	3	60 (?)
Post-standard X:		
2 government technical institutes	3	133
Engineering Faculty, Rangoon University	6	111

In addition, there are 27 middle and 48 high schools with an agricultural bias, and 62 technically biased high schools. There are also technical evening classes in Rangoon, with an output of sub-professional engineers of about 40 per annum.

In addition to training in full-time institutions, some in-service and apprentice training is carried out, notably by apprentice programmes operated by the Port of Rangoon, the Inland Water Transport Board, Burma Railways and the Electric Supply Board. Rangoon General Hospital has limited technical courses in radiography and physiotherapy. The Union of Burma

Applied Research Institute provides on-the-job training for technicians, the Department of Highways has a training centre, and the ILO has assisted in the establishment of a Regional Marine Diesel Training Centre at Dallah. The private Saunders Weaving Institute trains textile technicians.

A new industrial trade school has now been started at Aungsanmyo, with an enrolment of 100 students in five courses (radio, electrical wiring, carpentry, welding, machine-shop practice). In addition, 100 students are taken every three months for an intensive course in tractor mechanics, doing six months in the school and six months in the field: thus about 400 tractor mechanics per year are being produced.

It would appear from these figures that, until very recently, the proportions of training were inverted. The largest single output (135 per annum) came from the technical institutes, with entry virtually at matriculation level. The industrial trade schools were turning out only about 10 more artisans per annum than the Faculty of Engineering turned out graduate engineers (artisans, 120; graduates, 111). In fact, the majority of men doing skilled artisan work in Burma were not passing through the industrial trade schools but through apprenticeship schemes and by learning on the job.

1. It would appear reasonable to raise the level of entry to industrial trade schools to post-standard VII, and to establish one small technical teacher-training centre, in order to improve the standard of instruction in the industrial trade schools, which is at present unsatisfactory.
2. At the technician level (government technical institutes), where there is currently some unemployment, current policy may be to fit the subjects taught more closely to industrial demand. Over the ten-year period it should be necessary to raise the output of technicians to at least 300 per annum, the equivalent of two new institutes; but this expansion may not be necessary before 1966-68.
3. At the university level, total output is probably sufficient for another two or three years, but distribution by subject could be improved by producing more civil and agricultural engineers, architects, surveyors and quantity-surveyors.

   What is necessary above all is practical training. It might be valuable to send at least 20 engineers per annum (including any who may now be unemployed from earlier output) for two years' practical experience in any developed country and also to build up some post-graduate specialization. To achieve this, the university output could be allowed to rise slowly from 110 to perhaps 140 per annum in five years' time, followed by a review of needs.
4. Finally, the needs of industry are not only for technicians but for managers. Some extremely valuable work has been done by the Management and Administration Association of Burma and the Burma Management Institute, running courses from 7.0 to 9 a.m. throughout the week, in which

both civil servants and businessmen take part. It would be important to develop this; some methods of the Productivity Centre in Bangkok (Ministry of Industry) could be usefully employed in Rangoon. Nevertheless, working experience is vital, and maximum use of attachments overseas, at the expense of academic places if necessary, appears the most hopeful possibility.

Medical services

No fixed target can be set for the desirable strength of medical services; it is a question of what a country can afford in relation to other priorities.

Burma suffers from an acute shortage of doctors, and from maldistribution (about 50 per cent are in Rangoon). The expulsion of the majority of foreign doctors, mainly Indian, save for those with long service to the State, will have reduced the working force even further. In 1963 there were about 1,600 doctors practising in Burma, i.e., 1 : 14,000 of population. This means that rural areas were extremely short; even the township hospitals have in some areas been without a full-time medical officer. In 1962/63 there were 233 hospitals and 102 dispensaries in the country, with 29 smaller hospitals under construction in the districts.

The second layer of medical services consists of rural health centres, of which there were 495 in 1962/63. It is planned to increase these to 600 in 1963/64. Each centre is staffed by one health assistant, one lady health visitor, five midwives and one vaccinator. There are some shortages in this establishment, but training facilities are probably adequate to fill them over the next year or two. There are also over 100 maternity and child health centres, staffed by a lady health visitor and midwife.

There is a more serious shortage of trained nurses (mainly Karens and Christians, since the profession does not appeal to educated Burmese), and the proportion of nurses to hospital patients is as low as 1 : 18.

A number of special campaigns are in action (malaria eradication, BCG vaccination, venereal disease control and leprosy control); these are aided by United Nations agencies. The leprosy control campaign is highly successful and has been described as the best in South-East Asia.

Manpower targets

(a) *Doctors.* Total medical graduations in 1962 were 166, from Rangoon and Mandalay. A second medical school is to start in Rangoon, possibly using the Military Hospital for clinical work. The output from Mandalay which had been running at only 6 or 8 per annum up to 1962, should soon increase sharply, since total enrolment in 1963/64 was 454, with 46 in fourth year, 76 in third and 137 in second year. There is, however, a high percentage of failure, due to inadequate teaching of science in high schools and insufficient staffing of the Mandalay faculty itself. The use of Burmese as a language of instruction is progressively adding to this difficulty, since there are hardly any medical textbooks in Burmese and standards of English comprehension are inevitably falling. An output of 250 doctors per year, which should be a first target, would gradually raise the force to 3,000. It should be possible, over ten years, to raise this output to 350 per year, with a target of 5,000 doctors soon after 1975, i.e., 1 : 6,000 population. This rate of progress is determined by the extreme difficulty of finding the experienced and highly qualified teaching staff for a major medical school, and by the time necessary to improve secondary science teaching, without which it is impossible to use university teachers effectively. It will require maximum effort, especially at Mandalay, to achieve this target.

(b) *Supporting staff*. Output from high schools will certainly be large enough to supply the entrants for training of nurses, para-medical staff, technicians, etc. The main organizational and training structure exists, and it is a question of government policy to expand output at the rate required.

(c) The rural population has also the services of over 22,500 registered *Sesayas* (practitioners of traditional medicine) and about 20 dispensaries for traditional medicine handling nearly half a million cases. Relatively simple further training and equipment might increase the value of this help over the years when fully trained staff are not available.

EDUCATION AND MANPOWER SUPPLY

Education is both a supplier and a very heavy consumer of manpower. Calculation of the minimum desirable output from education involves three stages:

1. The output required at various levels to man the economy outside education.
2. Additional output to provide teachers for this level.
3. Additional output to raise educational standards generally, including the implied addition to the force of teachers.

For the requirements of higher manpower suggested here there is no need for any radical increase in secondary education. An enrolment of 100,000 in high schools should very easily provide for a university output of 4,000 per annum. It is only not doing so already owing to the high percentage fall-out after standard IX and of failures at matriculation and even during the university courses. From the 50,000 students who reach standard IX even now it should be possible to carry at least one-fifth through to matriculation (10,000), allowing a further selection after the intermediate examination.

At a lower level, however, there is clearly an intolerable waste of effort and resources where nearly 750,000 children fall out of the education system between standards I and II. The causes of this situation must be known or easily ascertainable, and the remedies will no doubt include the improvement of teacher training and the growing realization among parents that education should not be denied to their children. Over the next ten years it should be possible to carry at least 500,000 children through to standard IV (from an enrolment in standard I which is likely to rise to over 1 million) instead of the present 180,000. About half of these should be carried on to middle school, which would treble the current enrolments. From the end of middle school (seven years' education) enrolments in high school could be even more selective than at present, so that only those children really capable of higher academic education were carried onwards. This would allow of only a slow (though inevitable) expansion of high-school enrolment to perhaps 150,000, which might well be in excess of manpower requirements narrowly defined: the surplus could, however, be used to improve the initial qualifications of teachers in the lower levels.

In terms of the supply of teachers, the position in ten years' time could be summarized as in Table 9.

TABLE 9. Requirements for teachers, 1962-72

Teaching level	Stock 1962	Ten-year wastage (40 %)	Force required 1972	Total output required over ten years	Output per annum (average)
Primary	37 000	14 800	60 000 (2.0 m. + enrolled)	37 800	3 800
Middle	6 000	2 400	18 000 (600 000 enrolled)	14 400	1 450
High school	2 000	800	6 000 (150 000 enrolled)	4 800	480

There should be no difficulty in achieving the target of 480 teachers per annum for high-school work. The university is already producing 256 with diploma and 88 with B. (Ed.). In addition there are about 240 per annum obtaining the first B.A. (Ed.) degree. On the other hand, output from the State teacher-training colleges for middle schools is at present running at only 500 graduates per year, against the requirement of 1,500 which is suggested as the ten-year programme.

Both for high school, middle school and primary schools there are still a high percentage of untrained or under-qualified teachers. It follows that the requirements suggested above will mean a strenuous effort to increase the output and improve the quality of teacher training.

Finally, a total of ten years of education is probably too short a preparation for university entry. Consideration might well be given to extending the high-school course to at least four years.

In summary, the manpower needs of Burma (though not necessarily the consumer demands) will call for only a relatively small expansion, over ten years, of both high-school and university enrolments, though the quality and percentage success in examination should rise. On the other hand, Burma will need a far larger group who have achieved seven years of education and are capable of being trained for a large number of craft and junior administrative jobs, above all in the agricultural field. It is therefore suggested that, with only a minimum expansion of entry to standard I, a vigorous effort should be made to carry forward more children through primary and middle education. The targets tentatively suggested for a ten-year programme are: standard IV, 500,000 pupils; standard V entry, 240,000 per annum; high-school entry, 75,000 per annum; post-high-school training, 10,000 per annum; matriculants, 10,000 per annum; annual university output of 6,000 at intermediate and 4,000 at B.A.

Lastly, the present short high-school course (two years plus one pre-university year) ending after only ten years' total education from primary I is almost certainly too short to achieve a proper quality for university entrance or high-quality technological training. Additional educational effort would be better spent in lengthening the course to at least a four-year course before university entrance, rather than by any massive increase in numbers. The output would thereby rise rather more slowly; but this would appear to fit well with the fairly slow rise in employment opportunity over the next three or four years.

Thailand

GENERAL

The education and manpower needs of Thailand have been intensively studied in the last year,[1] and it is unnecessary for this report to go through the basic data in detail. What follows is therefore mainly devoted to certain comments on key issues. If I have interpreted the reports correctly, there has been a fundamental confusion between what manpower the economy as such needs for continued progress and what shape the educational system of Thailand is likely to take, or should take, regarded simply as an educational, social and political problem. After brief comments on the economy and the bare facts of educational enrolments and outputs, a section of this report will deal with this central issue: the fifth section deals with certain special sectors, in an attempt to indicate minimum requirements of high-level manpower to sustain economic growth and reasonable educational expansion.

Both in education and in economic atmosphere Thailand could be regarded as half-way house between Malaya and the Philippines. Education has not mushroomed as in the Philippines, but at university level has overrun the tight quality-control and shortage of numbers in Malaya. The economy, welcoming both internal and foreign private enterprise, is less tightly administered than in Malaya, perhaps a little more socialized than the *laissez-faire* philosophy of business in Manila. In consequence, the planner is faced in Thailand with a great deal of individualism socially, educationally and economically, which precludes any rigidity in planning; but none the less

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[1] (a) Thai-USOM Task Force, 1963; (b) Unesco Educational Investment Programming Mission, 1963; (c) Unesco Regional Advisory Team for Educational Planning, 1963; (d) *Education and Employment in Thailand*, by R. M. Sundrum and R. Daroesman (Unesco/IAU, 1964).

Government has a considerable planning mechanism for giving direction and balance to development.

THE ECONOMY

From various projections of population growth, this study is using that adopted by the Unesco Advisory Team (population in thousands): 1960, 26,990; 1965, 31,777; 1970, 37,537; 1975, 44,579; 1980, 53,291. This assumes rates of population growth rising from 3.3 per cent in 1960-65 to 3.6 per cent in 1975-80. Population in 1962 is assumed to be 28.8 million.

Gross national product has been rising lately at between 6 and 7 per cent, giving a *per capita* income of approximatively £37 in 1962.

The economy is primarily agricultural, with about 82 per cent of those economically active in agricultural pursuits (commerce 5.6 per cent; services 4 per cent; manufacturing 3.4 per cent; remainder 4.6 per cent—1960 population census). Agriculture, however, produces only 36 per cent of GNP. This percentage has fallen from 50 per cent in 1951, indicating a large rise in the non-agricultural sector. Employment in manufacturing was 470,000 in 1960, estimated to grow to 658,000 in 1966: but this includes cottage industry, etc. Employment by firms employing ten or more probably did not exceed 100,000-120,000 in 1962. No accurate figures are available. Major exports are, in order of importance (1962 value in million baht): rice, 3,301; rubber, 2,111; tin, 690; jute and kenaf, 589; maize, 502; tapioca products, 423;[1] teak, 170; castor seeds, 124; cattle, 103; kapok, 102; total 8,115.[1] The total of these ten exports represents 84.5 per cent of all exports; rice and rubber alone represent 56.3 per cent of the total. The balance of trade has recently been adverse (consistently since 1952), reaching an adverse total of 1,974[1] million baht in 1962 (nearly £34 million). This deficit has been mainly due to heavy imports of machinery, fuel, chemicals and manufactured goods. This balance has been met partly by foreign investment and partly by international aid on a large scale.

The remarkable rise in national income is in part due to additional agricultural production (but this is estimated as only 58 per cent for 1951-62);[2] partly by heavy investment in the development of Bangkok and huge foreign aid spent there; partly to quite rapidly increasing industrialization. Industry in Thailand has the makings of a 'heavy' sector—a large iron foundry, a large unit galvanizing and corrugating iron sheet, a steel-rolling and aluminium-rolling mill, some non-ferrous metal work, an oil refinery and a chemical fertilizer plant. There is to be a tyre factory, large cement mills, and a growing amount of truck and car assembly. Gunny-bags, pharmaceuticals, textiles, plywood, minor engineering, sugar, rice and sawmills may be mentioned among a large number of secondary and processing industries. The Board of Investment lists 141 certificates issued for new firms, and another 125 approved or under consideration (October 1963). Capital involved for the 141 firms to whom certificates were issued was 2,029 million baht (£34 million). Power supply will be more than adequate—though it is at present too expensive—and a considerable programme of road improvement is planned and financed but proceeding slowly. Bangkok particularly has been a boom town for some years, attracting alike tourists, foreign missions and agencies of all kinds, and foreign investors. It is, however, significant that after the 3 million population of the Bangkok-Thonburi complex the next largest town in Thailand is Chiengmai, with a population of 56,000.

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[1] Bank of Thailand gives 404 for tapioca products and total 8,098 million baht; 1,836 million baht for trade deficit.

[2] Unesco Educational Investment Programming Mission, 1963.

In the agricultural sector progress is less encouraging. Rice yields, though ahead of Burma or the Philippines, are still far behind the leading Asian producers (about 215 kg. per rai[1] in 1962 against 709 in Japan (1957) or 467 in Taiwan (1957). There has been considerable diversification recently, and in particular the prospects for cotton in the drier areas seem extremely hopeful. Schemes for irrigation and flood control, the use of fertilizer, and the opening of better communication should all increase agricultural potential. But the real revolution in agricultural productivity is still far ahead in the future.

In summary, the Thailand economy rests first upon a huge and quite comfortable agricultural population, which has not yet been stirred to more than moderate efforts, so that a population increase of 3.5 per cent will catch up with production and eat into export earnings unless there is a considerable rise in productivity. Secondly it rests upon a fast growing industrial sector which is, however, very small in relation to total population and labour force. Thirdly, upon a commercial and construction boom based on Bangkok with its attractions for foreign spending and investment.

THE EDUCATIONAL SYSTEM

The educational system was originally directed into a four-year primary course (Pratom I-IV) and an eight-year secondary course (Matayom 1-8) broken at Matayom 3 which was the end of the junior secondary stage, and at Mayom 6, before the last two years of pre-university work. It is now a seven-year primary course (Pratom 1-7) followed by a five-year secondary course (Matayom Suksa 1-5), broken at MS 3 (the old Matayom 6), MS 4 and 5 are the two pre-university years.

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[1] 1 rai = 0.4 acre.

Primary, 1961 (1962)

Total I-IV	*I*	*IV*	*Total V-VII*	*V*	*VII*	*Total I-VII*
3 716 969	1 322 855	657 313	375 953	137 054	112 714	4 092 922
(3 721 308)	—	—	(364 826)	—	—	(4 086 134)

It is estimated that from 1,000 children in standard I, 696 reach standard IV and 136 reach standard VII. Private schools represent about 10 per cent of the enrolment in standards I-IV, almost 50 per cent in V-VII.

General secondary, 1961 (1962)

MS 1-3	*MS 1*	*MS 3*	*MS 4-5*	*MS 4*	*MS 5*	*Total MS 1-5*
236 244	93 790	66 496	34 512	22 091	12 421	270 756
(251 236)	—	—	(36 094)	—	—	(287 330)

It is estimated that out of 1,000 children entering primary standard I, only 121 enter MS 1; 118 reach MS 3 and 31 enter MS 5.[1] Private schools represent 43.5 per cent of MS 1-3 and 55.5 per cent of MS 4 and 5. It is interesting that over 70 per cent of secondary enrolment is in the science streams.

Vocational education, 1961

'Short time'	*Junior vocational*	*Senior vocational*	*Higher vocational*	*Technical*
1 923	666	16 880	29 327	4 891
			Graduates, 1961	
		5 949	8 796	1 673

'Senior vocational' corresponds to MS 1-3, 'higher vocational' to MS 4-5 with one additional year (i.e., to grade 13). Technical institutes run to grades 14, 15 and sometimes 16, corresponding to three or four years of university work. There is considerable evidence that senior vocational schools are becoming increasingly unpopular, and applications are falling. There is substantial unemployment among graduates from these schools. There remains strong competition for entry into higher vocational and technical courses.

University education

The total enrolment in universities in 1961 was approximately 40,900 and in 1962 42,100. But these figures include a very large number of part-time or even nominal enrolments at Thammasart. These Thammasart enrolments were regarded as the equivalent of 2,500 full-time enrolments by the Unesco mission. In fact, about 7,000 students were regularly attending lectures at Thammasart in 1963, and it would possibly be preferable to allow 5,000 students, bringing the total enrolled in all university education to 16,500 or thereabouts: Chulalongkorn, 6,223; Thammasart, 5,000; Kasetsart, 2,101; Medical, 2,966; Silpakorn, 350; total 16,640.

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[1] The Unesco mission gives slightly different figures, implying that less than 10 per cent of primary I enter secondary school, and that only about 5 per cent of those entering MS 1 actually enter university work.

Table 10 shows the division by subjects studied and graduations (42,000 students, i.e., including Thammasart at full nominal strength) in 1962.

TABLE 10. University education: enrolments and graduations, 1962

Subject	Enrolment	Degree	Diploma
Natural science, engineering	3 017	401	254
Humanities, arts	33 153 (7 711)[1]	1 651	171
Medicine and nursing	3 150	392	177
Agriculture	2 101	241	333
Education	683	214	18
TOTAL	42 104 (16 640)	2 899	953

[1] 5,000 at Thammasart and 2,711 at Silpakorn.

The new university in Chiengmai has had a Medical School from which the first graduates will emerge in 1964. Other faculties open in 1964. The University of Khonkaen (or the Institute of Technology) will admit students in 1964/65.

In 1963 about 20,000 students applied for 5,000 places in Thai universities. There were only about 12,000 enrolled in MS 5, so that many applicants must have come from earlier years. Many applicants have not passed the entry examination, and many of these gain admission—in fact 700 out of 933 admissions to Thammasart in 1963 had failed the entry examination, and this applies to other universities, although in unknown proportions. Usually about 60 per cent pass the final MS 5 examination, so that every year there are 7,000 (rising to 8,000) new applicants for about 5,000 (rising to 6,000) places, apart from those who make a second attempt. It may be that well under half actually pass the university entry tests.

EDUCATION AND MANPOWER DEMANDS

In this section an attempt is made to distinguish between education demands—that is, a programme which will give some satisfaction to the popular demand for education and keep some gradual rise in educational attainment of the population as a whole; and economic manpower demands—that is, the requirements for particular types of education and training necessary to maintain economic progress. This distinction cannot be precise and rigid: quite clearly, some economic effect is produced by an output of far more graduates than appear to be necessary for the economy. But at some point financial considerations have to be taken into account (since the investment in education, whether private or public, is at the expense of some other investment): further, social expectations and disappointments can be important, if the attainment of a certain educational level does not reward the graduate with employment of the type which he thereby expects. The distinction is therefore useful in analysis.

Thailand, by 1960, had already accumulated a large stock of manpower with some higher education. The census of 1960 shows[1] a total stock of 95,137 with some college education, and 618,997[2] with some secondary (MS 1-5). This amounts to 2.6 per cent of total population, a percentage far higher than any probable number of Category I and II posts. However, a high proportion of these were not economically active: the labour force, 15 years and over, in 1960, included 56,290 with college attainment (of whom nearly 17,000 were women), and 400,000[3] MS 1-5 (including 92,000 women). Further, it includes a high proportion of 'own account' workers and 'others' compared to the number of employees:

	Employers, government and private employees	*'Own account' or 'Others'*	*Total*
College attainment	38 024	18 266	56 290
MS 1-5	102 600	297 400	400 000

One further fact may be mentioned from the 'educational attainment' figures —only 27,000 of total population had had four years of college or more.

While among college graduates quite a large number of posts would be held by 'own account' workers, neither employing nor employed (for example, doctors, lawyers, etc.), it seems less likely that the very large number of secondary graduates could have been in high-level occupations under these headings. Many were, no doubt, women doing part-time work, and many of the men must have been in fairly modest occupations.

We thus have a picture of a society in which higher education is much valued and sought after; in which quite large numbers of those who had been to college were not actively engaged in the economy; in which large numbers of women gained higher education, many of them no doubt to manage family business affairs; in which an unusually high proportion are described as 'own account' workers, including many with only a partial secondary education; in which government employment is highly valued and much oversupplied. It is a society of considerable private individual self-reliant effort to find a niche in affairs from which a living can be gained, though not necessarily a 'high-level' niche; and a society with a small 'modern sector' of fairly recent origin. It would be surprising if formal employment in high-level posts was very large. In fact, a rough analysis of census occupational data, as used elsewhere in this report, suggests a relatively low number of Category I and II posts—roughly 30,000 in Category I and 70,000 in Category II. These figures are not so very far from the 38,000 university and 102,000 secondary graduates which include all employers and employees, recollecting that the 102,000 include those who only reached the first year of higher secondary education and would not normally be automatically included in Category II potential.

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[1] I am much indebted for much of the analysis of educational attainment to *Education and Employment in Thailand, 1960,* by R.M. Sundrum and Ruth Daroesman, 1964 (Unesco/IAU).

[2] Of which MS 4 or 5, 109,998; MS 1-3, 508,999.

[3] This is a proportion of 686,025 who had attained any grade from Pratom V to MS 5 and were economically active, with an assumption that those with higher grades had a lower proportion in the labour force.

The ten-year projections from my Category I and II figures, assuming 60 per cent economic growth, 120 per cent Category I and 180 per cent Category II growth over ten years, gives the following result:

Category	*Stock 1960*	*Ten-year wastage (40 %)*	*Ten-year growth (120 % I: 180 % II)*	*Ten-year requirement*	*Required output per annum*
I	30 000	12 000	36 000	48 000	4 800
II	70 000	28 000	126 000	154 000	15 400

If we now turn to the projections of outputs required made by the Thai-USOM Task Force and by the Unesco Educational Investment Mission, we find that the annual average requirements for 1960-66 and for 1960-80 respectively give the figures set out in Table 11 for outputs on various assumptions.

The estimates preferred by the Unesco mission are C2 for 1960-66 and B1 for 1960-80 (printed in italics).

It will be seen that the estimates for university graduates, averaged at 2,500 for 1960-66 and 3,500 for 1960-80, are markedly lower than the Category I estimates above. Secondly, that the estimates for twelfth-grade graduates are considerably higher in all cases and nearly three times as high for estimate C2, which is that preferred by the Unesco mission. There are, however, two strange points about these estimates for an average output of 42,000 twelfth-grade graduates in 1960-66 and 44,875 in 1960-80. In the first place, the rate of increase in 1970-80 is strangely low; in the second place, the proportion of twelfth-grade to university graduates is extremely high—over 10 to 1. It is highly unusual for the proportion of technicians to

TABLE 11. Average annual outputs on various assumptions

Assumption		Average annual outputs			
		1960-66		1960-80	
		University graduates	Twelfth-grade graduates	University graduates	Twelfth-grade graduates
A1	Constant enrolment rates	2 600	20 000	3 000	29 000
A3(a)	Seven years' compulsory education by 1980	2 600	20 000	(3 500)	(44 000)
B1[1]	Occupation shift, 1960 educational attainment	—	—	*3 459*	*44 875*
C2[2]	Economic trends upgraded	*2 556*	*42 362*	—	—
D1[3]	Occupational demand (selected sectors)	2 567	10 677		

1. Estimate B1 takes into account a possible occupational shift out of agriculture into the modern sector.
2. Estimate C2 is based on possible labour-force demand, assuming the labour force in each economic sector has an educational attainment upgraded by 2 per cent per annum.
3. Estimate D1 is built up by occupation, in occupations other than agriculture, fisheries, forestry, mining and construction. It includes manufacture, trade, transport, communications, power and services.

graduates to rise above 5 or 6 to 1 in a country with Thailand's economic shape, where a figure of 4 to 1 or even less might have been expected. In 1962 the actual outputs from MS 5 (twelfth grade) were about 12,000, against 2,800 university degrees—a proportion of just over 4 to 1.

There is, I believe, a simple explanation of these high twelfth-grade figures. They were obtained by estimating labour force increases by industrial sectors and then making the assumption that the educational attainment in these sectors, over the whole kingdom, would be the same as those for the same sectors in the Bangkok-Thonburi area.[1] But this is very far indeed from being true, since there is an extremely heavy concentration of highly educated manpower in Bangkok-Thonburi: 52 per cent of all those with some college education are in Bangkok-Thonburi, and 60 per cent of those with four or more years of college education, with a population ratio of roughly 3 million in Bangkok-Thonburi to 27 million for the whole kingdom. The table[2] below shows actual educational attainment of the whole population (15+) against what it would have been if the whole population had had the same level of attainment as that of Bangkok-Thonburi. The latter figure is described as 'derived'.

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[1] *Thai-USOM Task Force Report,* No. II, Appendix B, para. 13.
[2] R. M. Sundrum and Ruth Daroesman, op. cit.

	Actual 1960	*Derived 1960*	*Ratio: actual-derived* %
Pratom V-VII	420 000	1 183 000	36
MS 1-5	619 000	2 367 000	26
College	95 000	736 000	13

This comparison by the whole population over-emphasizes the difference, since the occupational pattern of the labour force in Bangkok-Thonburi is different. But when the comparison is made, assuming that the whole kingdom has the same educational attainment in each occupation as that for occupations in Bangkok-Thonburi, the actual/derived ratio is as follows:

	Actual	*Derived*	*Ratio: actual-derived* %
Pratom V-VII	420 000	879 000	48
MS 1-5	619 000	1 191 000	52
College	95 000	263 000	36

It is clear that the use of the Bangkok-Thonburi ratio must have greatly inflated the suggested educational attainment of the labour force. While the proportions are more widely different for college than for secondary graduates, in fact it is probably the secondary figure which is more out of line. For graduate employment is in fact likely to be mainly in Bangkok-Thonburi, and the use of the Bangkok ratio for them is therefore more plausible. But employment of secondary graduates is widely spread throughout the kingdom, and a 'whole kingdom' ratio applied to it would reduce the estimated requirements of 40,000 by nearly a half.

It is perhaps significant that the estimate by occupational sectors (D1) which covers occupations accounting for 57 per cent of national income, and in particular almost all occupations which normally require a higher percentage of graduates (government, industry and commerce, as against agriculture), shows a requirement of only 10,677 twelfth-grade graduates in the 1960-66 period, but virtually the same number of university graduates. It may also be significant that the purely educational estimate A1, which is made without reference to employment opportunity, gives a figure of 20,000 grade 12 graduates for the 1960-66 period and 29,000 for 1960-80—higher than the D1 estimate even if the latter were rounded to cover all occupations. These two facts together, with the additional pointer that there is considerable unemployment among secondary graduates, suggest that the purely educational estimates are in fact outrunning rather than falling short of employment opportunity.

I have only loaded this report with these somewhat complex calculations because a vitally important point of policy is at stake—whether to aim at an output of 40,000 twelfth-grade graduates in the immediate future or at one of 20,000. In my view the economic manpower requirements do not justify rapid expansion of secondary output beyond a figure of 21,000 to 22,000 per annum as an average up to 1970, allowing 15,000 for post-secondary training and 6,000-7,000 for university entrance. I would justify and describe this as follows, from the facts given above.

By 1960 Thailand had accumulated a large stock of men with some college or secondary education. But a considerable proportion of them were not economically active, and a very high proportion had not completed a university degree or the twelfth year of secondary education: only 27,000 had had four years in college, against 95,000 with some college education; only 109,000 had reached MS 4 or 5 out of 619,000 with some secondary (MS 1-5) education. Analysis of Category I and Category II jobs suggested employment opportunity for about 30,000 college graduates and 70,000 secondary graduates in occupations for which these levels of education might be regarded as highly desirable, if not essential. There was also evidence that quite large numbers of secondary graduates were failing to find employment. By 1961 the Labour Division of the Ministry of Public Welfare discovered from a sample survey of vocational and professional graduate employment that almost 40 per cent of graduates from these levels of education were unemployed and looking for work. If any other evidence were needed for overproduction, it is enough to state that in 1963 three of four clerical vacancies in the Civil Service would attract over 1,000 applicants, all with some secondary education and some with several years in college.

Against this evidence of unemployment must be set evidence from industrial employers of a shortage of certain well-trained professionals and technicians, notably engineers and chemists, technicians and working foremen.

The conclusions seem to be:

1. That by 1960 the Thailand educational system was over-producing from its secondary institutions in terms of employment opportunity in the labour force at levels requiring secondary education.
2. That even out of this large production, too small a number were achieving the quality and receiving the practical training which would make them acceptable to industrial employers.
3. That, in consequence, the economic manpower requirements lead to only a modest expansion, perhaps an output of 20,000 or so twelfth-grade graduates per annum, rather than 40,000 (the latter figure having probably arisen from a projection of Bangkok-Thonburi attainments to cover the whole country's labour force). This conclusion is supported by a normal

projection of the Category I and Category II posts in a ratio of twice and three times the rate of economic growth respectively, and by the Thai-USOM projection (D1) for expansion in specific occupations over that section of the economy where graduate skills are needed in largest numbers. The latter shows a lower figure than my own.

4. That, although this expansion should be moderate in terms of general education, a very considerable increase is needed in practical post-secondary training, so that these graduates are fitted to work in the modern sector of the economy and are acceptable to employers.
5. These arguments are expressed in terms of employment opportunity. They are not arguments against higher production of secondary and university graduates simply to satisfy the wish for higher education and to provide an even larger pool of educated men and women in Thailand. This policy could have its own justification, balanced against the necessary investment and possible anxieties about graduate unemployment. What is important is that the larger outputs should not be regarded as essential on economic manpower grounds.
6. That the following manpower targets would be appropriate:

Category	*Stock 1960*	*Wastage to 1970 (40 %)*	*Growth to 1970*		*Requirement*	*Annual requirement*
I	30 000	12 000	30 000	(100 %)	42 000	4 200
II	70 000	28 000	126 000	(180 %)	154 000	15 400

Category	*Stock 1970*	*Wastage to 1975 (20 %)*	*Growth to 1975*		*Requirement*	*Annual requirement*
I	60 000	12 000	24 000	(40 %)	36 000	7 000
II	196 000	39 000	117 000	(60 %)	156 000	31 000

I have slightly reduced the rate of growth for university graduates, to conform to other estimates, and also the rate of economic growth 1970-75 to 4 per cent per annum, since there is likely to be some slowing down after the spirt in which Thailand is at present engaged. A ratio of 4 : 1, secondary to university graduate, rising slowly to 4.5 : 1 is retained throughout. The final 'stock' figures for 1975 would give a ratio of 0.9 per cent high-level manpower to total population in 1975.

It is important to note that the annual requirements for secondary graduates are additional to university entry—i.e., students available for on-training at post-secondary level for Category II jobs. Total outputs from secondary would therefore have to be a little over 20,000 in 1962-70 and 40,000 in 1970-75.

In terms of feasibility, and of other projections, these suggestions seem reasonable for secondary graduates. Certainly 20,000 per annum is possible in 1965-70. For 1970-75, the Department of Secondary Education estimated 32,000 in grade 12 (MS 5) in 1971. Other estimates and projections range up to 50,000 (Thai-USOM Projection III).

However, the suggested university outputs are a good deal higher. The Unesco Advisory Team for Educational Planning projected a university enrolment of 28,300 (intermediate) or 38,000 (maximum) by 1975; 21,200 (intermediate) or 23,800 (maximum) by 1970.

These figures, with great deference, seem to me very low in comparison with those for the numbers in grade 12. If there are over 30,000 in grade 12 in 1970, it seems unreasonable to assume that less than one third—10,000—will enter the university in 1970/71, and such an entry, rising a little each year, should ensure a total enrolment of 40,000 by 1975, and an output of at least 6,000, even if 40 per cent fall by the wayside (4,000 out of 10,000 entrants).

Category I need not consist 100 per cent of university graduates. Particularly in top management of industry it is most unlikely to do so. But in most developing countries, where educational qualifications are easier to find than long experience, the percentage is likely to be about 80 per cent. I would be inclined to adhere to a figure of 7,000 per annum Category I recruits by 1975, consisting of 5,500 university graduates and 1,500 from higher technical and other sources. The attainment of a stock of nearly 1 per cent high-level manpower to population by that date seems to be the least which Thailand should attempt.

SPECIAL MANPOWER REQUIREMENTS

Agriculture

That there is room for great increases in productivity and much diversification of crops in Thailand is not questioned. There is, however, little agreement on the best method of achieving this. Some observers believe that, since the agricultural advisory and extension service has been somewhat ineffective, it would be useless to multiply numbers, and that the Chinese middleman is the most effective agent in introducing new crops and methods to the farmers from whom he buys. However, it is scarcely acceptable that a country so dependent on agriculture and so well endowed with secondary and university education should be unable to train and administer a full-scale and efficient system of agricultural advice and extension work, well backed by methodical research. To create such a force is the target underlying the following notes.

At first sight, Thailand appears to possess the necessary educational equipment to create a proper service. Table 12 shows enrolments at Kasetsart University in 1962.

TABLE 12. Kasetsart University enrolments, 1962

Subject	Associate[1]	Bachelor	Master
Agriculture	903	330	16
Economics and co-operatives	314	125	22
Fisheries	93	32	—
Forestry	223	99	93
Veterinary	86 (Pre-vet.)	—	—
Irrigation engineering	187	70	—
	1 806	656	131
GRAND TOTAL		2 593	

[1] The 'associate' course is for two years in the university. The bachelor course is for five years.

In 1961/62 318 students were in their fifth year, 13 (veterinary) in year 6 and 39 were post-graduate students. Kasetsart gave 220 bachelor and veterinary degrees in 1961, plus 256 'associate' certificates.

If the agricultural advisory, extension and research services are put at a somewhat higher figure than those for Burma (since Thailand can both afford to produce more and has the facilities), a structure on the lines of Table 13 might be appropriate.

TABLE 13. Field force (advisory/extension)

Sector	Graduate	Diploma	Third level
Agriculture	400	1 000	4 000[1]
Veterinary	200	400	2 000
Forestry	75	150	
Fishery	50	75	
Co-operatives	25	75	
TOTAL	750	1 700	6 000

[1] Just over 1 : 1,000 agricultural families.

In addition to this field force, it could be assumed that about three times the number of graduates, many from the biological and physical sciences—not from agricultural courses—would be needed for research and for teaching in university and diploma-level institutions—say 2,000. A number of diploma-level assistants would also be needed in research stations. The total force engaged, and outputs per annum to maintain such a force (assuming a working life of 25 years) would be as shown in Table 14.

TABLE 14. Agricultural services: total force and outputs required

Service	University graduate		Diploma-level	
	Stock	Annual output	Stock	Annual output
Field force (all subjects)	750	30	1 700	88
Research, teaching, ancillary	2 000	80	500	
TOTAL	2 750	110	2 200	88

About 500 staff are already employed in research and experimental stations. In addition, maintenance of 6,000 third-level field workers would involve an annual output of 240.

Kasetsart University is already producing an annual output of more than double these numbers at both levels. Moreover, the Maejoh College near Chiengmai should be able to produce 40 students per annum on its five-year technical course and over 100 from its shorter (higher vocational) three-year course. Underlying the college courses there are the agricultural vocational schools. It is thus quite clear that in terms of annual output the existing institutions in Thailand could well produce enough raw material at all levels.

Many observers in Thailand agreed that the agricultural service is in fact neither so well recruited nor so effective as it could be for two basic reasons. First, the university training—and probably that at lower levels—is not sufficiently practical. It is most unfortunate that the main university training should be virtually all in Bangkok, attracting potential field staff to a city which they are unwilling to leave, and too divorced from the real agricultural life of Thailand. Even at Maejoh, equipment was far below good standards for a diploma course (only two tractors were available, one out of order) and teaching staff were inadequate both in number and quality.

The second main reason lies in the organization and direction of research services. Part of this trouble may lie in the separate systems built up by the Rice and Irrigation Departments; part is due to insufficient co-ordination and direction of the research programmes and inadequate funds provided for them. It will be necessary, if the Research and Field Services are to become effective, to make a new start in both, with longer and more solid research programmes and an entirely different attitude to training for field work in remote provinces. The establishment of new agricultural faculties at Chiengmai and later at Khonkaen would provide an opportunity for a complete revision of the training and attitudes of graduate and diploma field staff, which would have to be supported by equipment, transport, technical literature and many other facilities which would enable graduate officers to do an effective job. This is essentially a matter of quality, training and equipment—not of numbers.

Engineering, Science, Management

Engineering. Chulalongkorn is the only university giving engineering degrees at the present time, save for the irrigation engineers produced by Kasetsart. About 1,350 students were enrolled in the faculty in 1962/63, plus 62 in the SEATO Graduate School (not all Thai nationals). Students may take a three-year course leading to associate/diploma level or a four-year course leading to the bachelor degree. About 120 degrees were granted in 1958, and about 250 were expected in 1963. The new university at Khonkaen is to have a department of technology which will presumably go to full professional standards.

Outside the universities, the higher vocational and technical courses must be taken into account.

Higher vocational. The enrolment in 1961 amounted to 29,000, of whom 10,000 were women. Woodworking, building trades, mechanics, domestic science and commerce accounted for 80 per cent of the students. The course corresponds to grades 11, 12 and 13. There were in 1961 8,796 graduates.

Technical. This course corresponds to university grades 14, 15 and 16. It has a growing enrolment, reaching 4,891 in 1961, and probably nearly 6,000 by 1962. It is concentrated on building construction, auto-mechanics, electricity, radio, and television. There were 1,673 graduates in 1961 and probably over 2,000 by 1963. The Unesco Educational Planning Team made projections suggesting enrolments of about 100,000 in higher vocational and 20,000 in technical by 1970/71. Such numbers, implying annual outputs of 25,000 and 5,000-plus respectively by 1973, would, by themselves, go three-quarters of the way to meeting the requirements of the entire economy for Category II personnel, even if these were put as high as 40,000 per annum.

In terms of numbers, the requirements of Thailand for engineers are extremely hard to estimate, since so much depends upon the growth of manufacturing industry and of the engineering elements in irrigation and power supply (including any new development in the Mekong schemes). There were just over 800 engineers and architects listed in the 1960 Census. If Thailand is to reach the level suggested for Malaysia (smaller, but perhaps more industrialized and with a much higher national income), a stock of 4,000 engineers by 1970 might have been a suitable target. However, even if the stock has been increasing at over 150 per annum, this target cannot be attained from the output of Chulalongkorn University, the irrigation engineers from Kasetsart and any new output which might come from Khonkaen by 1970 at the earliest.

If, over the fifteen years 1960-75, output from Kasetsart (K), Chulalongkorn (C) and later Chiengmai (Ch) and Khonkaen (Kh) could be raised to: 1963, 230 (200 C, 30 K); 1968, 280 (250 C, 30 K); 1970, 310 (250 C, 60 K); 1975, 450 (250 C, 60 K, 40 Ch, and 100 Kh) with appropriately graded intervals, the total produced over fifteen years would be about 4,565. Added to the stock of about 800 in 1960, less 50 per cent wastage, this produces a stock for 1975 of just under 5,000, and an output which continues to raise the stock by about 250 per annum after wastage. This suggestion is made on the basis that Chulalongkorn should not attempt to raise output above 250 per annum; that the Irrigation section in Kasetsart should be raised to an annual output of 60 but diversified into all forms of agricultural engineering; that Chiengmai could make a limited contribution by 1970; and that a full new engineering faculty would be established at Khonkaen.

These outputs would be hard to attain, but they do not give an extravagant force of engineers for the needs of Thailand by 1975. Indeed, if industry were to continue its rapid development and agriculture were to get a fair share of engineers, it would be inadequate. But it should be supplemented by engineers of sub-professional but good quality from the higher technical institutions which should play a decisive part in meeting needs, especially up to 1970.

As in the case of agriculture, a decisive issue in the effective production of engineers will be the practical nature of their course and the opportunities given, if necessary abroad, for two years of engineering practice in workshop or field conditions in order to gain proficiency.

Science. So much has been said of the need to improve the quality of science teaching and to increase the output from science faculties that it would be futile to go over this ground here. It is enough to observe that behind every field officer in agriculture should be an output of at least three scientists, and behind every engineer and industrial chemist probably a similar or larger output of four to five physical scientists for the whole range of sciences underlying a more industrialized sector and for teaching. This alone would indicate a need for an output of at least 2,000 graduates per annum in the science faculties, excluding the output of doctors, agricultural officers and engineers.

The new Science Foundation will no doubt greatly help in the training and application of scientific personnel. But the real effort and difficulty will be in starting to build in the universities a far greater and better undergraduate and teaching force. In order to obtain a sense of balance, I might anticipate the later sections by suggesting at this point the balance of output per annum which might be reasonable for a university system by 1975: sciences (supporting agriculture, medicine, industry), 2,000; arts (including social science), 2,000; medicine (doctors), 500; agriculture, veterinary, forestry, irrigation, fisheries, 100; engineering, all types, 450; education, 750; total 5,700.

Even a glance at the range of technology associated with modern industry, a modernized agriculture, and medicine, all of which require a first degree in mathematics, physics, chemistry or the range of biological sciences, will be enough to show that a ratio of at least 3 to 1 between the teaching, research and specialist force and the general practitioner is needed. I emphasize this point because none of the projections suggested a figure of output from the science faculties as such which is in scale with the proposals for engineers, doctors and field agriculturalists. A proportion of 50 : 50 science/arts is probably too low on the science side. As in the case of Indonesia a tremendous effort to build up the science faculties will be needed if this high target is to be achieved.

Management and in-service training. All developing countries suffer from a shortage of practical training and managerial experience, because the industrial sector is at first too small and too young to give scope for in-service training on an adequate scale. The production of engineers and technicians from colleges does not meet this problem, since they are still equipped only with theoretical knowledge gained outside the realities of industrial life. The establishment of the excellent Productivity Centre in the Ministry of Industry is a great step forward in management training. Every effort to encourage the larger firms to develop apprenticeship and internal technical training will be worth while.

Medical

The census of 1960 showed 2,330 physicians and surgeons, but the Medical Register in 1963 showed 3,783. About 500 are probably abroad, and a number on the register are not practising. It might be reasonable to accept a figure of 2,500 doctors practising in Thailand in 1961—less than 1 : 10,000 population. The distribution is heavily in favour of Bangkok (about 1 : 1,100), whereas it is thought that in north-east Thailand the proportion is in the region of 1 : 50,000.

The output of medical degrees was about 200 per annum in 1960 and 250 per annum in 1963. The Thai-USOM Task Force gave projected outputs rising to 375 in 1975 and 450 in 1980. The aggregate outputs suggested were (approximately): 1961-70, 2,500; 1971-75, 1,800; 1975-80, 2,100. Allowing for 40 per cent[1] wastage every ten years, these figures would give the following results:

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[1] Since doctors work on after normal retirement, this may seem too high, but there is bound to be some continued emigration overseas.

Stock 1961	Wastage to 1970	New output	Stock 1970	Ratio 1970 (pop. 37.5 m.)
2 500	1 000	2 500	4 000	1 : 9 400

Stock 1970	Wastage[1] to 1975	New output	Stock 1975	Ratio 1975 (pop. 44.6 m.)
4 000	800	1 800	5 000	1 : 8 900

Stock 1975	Wastage to 1980	New output	Stock 1980	Ratio 1980 (pop. 53.2 m.)
5 000	1 000	2 100	6 100	1 : 8 700

If 35 per cent wastage, instead of 40 per cent, per ten years were assumed, the resulting ratios would be only slightly improved.

This is a somewhat leisurely rate of growth, particularly since medicine is a first choice among Thai students. To achieve a ratio of 1 : 5,000 by 1980 would require the following annual outputs, allowing only 35 per cent wastage from original stock in each ten-year period in order to give the most favourable picture:

Stock 1961	Wastage to 1980	Stock required 1980	Output required	Per annum
2 500	2 700	10 600	10 800	540

It is clear that even by 1980 it will be difficult to reach a 1 : 5,000 ratio. It will not be possible to produce much more than 2,800 by 1970 even if the suggested outputs up to 1970 were considerably increased; and this would leave 8,000 to produce in the decade 1970-80. Since population projections vary a good deal by 1980, as do other economic circumstances, it may be more sensible to confine targets, for the time being, to 1975 and to suggest a more moderate, but still stiff target of 1 : 7,000 by 1975:

Stock 1961	Wastage to 1975	Stock required 1975	Output required	Per annum
2 500	1 575	6 370	5 445	363

This means 2,800 in 1961-70 and 2,645 in 1970-75, i.e., over 500 p.a. in the 1970-75 period. This would certainly involve a fourth medical school, in addition to Bangkok (2) and Chiengmai, to reach an output of over 500 doctors per annum in the mid-1970's. It may well be that this is beyond the resources of Thailand, taking into account other commitments.

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1. By dividing this period up and applying wastage to the new stock figure at the start of each period, I have departed from my usual pattern of applying wastage only to original stock; and this has increased the wastage figures.

At the sub-professional level, there were in 1960:[1] 147 first-class health centres (with medical officer, sanitarian and midwife); 670 second-class health centres (with sanitarian and midwife); 761 midwifery centres (midwife only). The aim is to provide 500-600 first-class health centres.

There were in 1960 about 4,700 trained nurse-midwives; in hospitals the nurse to bed ratio was 1 : 8. The five-year target was to increase the number of trained nurses to 10,500 professional nurses or nurse/midwives, 6,000 midwives, and 3,500 public health nurses, a total of 20,000. The output from training, in 1960, was 450 nurse/midwives, 215 midwives, 150 auxiliary nurses, and 25 public health nurses (post-graduate course). It is almost impossible to calculate wastages, often due to marriage, but they are exceptionally high in the nursing profession, probably at least 6 per cent per annum. If this figure is correct, there might well be room for increasing nursing training to at least 800 p.a. and midwife training to 450 p.a.

Teachers

The detail of the very large supply of teachers required for education in Thailand will be dealt with in the main report. I am indebted to the director and staff for Table 15, an extremely useful and neat table of the 1961 stock position by type of school and by qualification.

TABLE 15. Teachers, 1961

School level	Degree	Higher Certificate	Others	Total
Pratom 1-7	408	3 337	109 780	113 525
Secondary 8-12	2 156	6 694	8 609	17 459
Teacher training	1 110	382	224	1 716
Vocational	632	945	3 471	5 048
TOTAL	4 306	11 358	122 084	137 748

In terms of gross numbers, and a loss of 40 per cent over ten years (which is almost certainly too low, as teachers migrate frequently into other occupations if the economy is expanding fast, because pay tends to be higher outside the teaching profession), the requirement simply to replace this force would be 5,500 per annum. It is clear, however, that, in addition to some increase in numbers, the quality of the force in terms of training to higher levels would need to be improved. Again, I am indebted to the Director for two projections based on the minimum and the maximum projections made by the Unesco Advisory Team. These two projections assume that 1 per cent of teachers in Pratom 1-7 and 40 per cent of teachers in secondary and vocational schools will be degree-holders, and that 9 per cent of teachers in Pratom 1-7 and 50 per cent in secondary and vocational schools will have the Higher Certificate (see Table 16).

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[1] *Health Services in Thailand* (Ministry of Public Health, 1961).

TABLE 16. Minimum projection

Educational attainment	Stock 1961	Requirement 1970	Net addition	Wastage	Output	Annual rate	Total 9 years
Degree	3 200	10 850	7 650	1 750	9 400	1 040	
Higher Certificate	11 000	21 650	10 650	4 080	14 730	1 640	
Lower Certificate	122 100	121 500	—	30 450	30 450	3 380	6 060

On the basis of the maximum projection, the annual requirements suggested are 1,970 degree, 2,960 Higher Certificate, and 7,820 Lower Certificate, a total of 12,750. The wastages were calculated as 25 per cent of the average figure between stock 1961 and requirement 1970. For consistency, these figures are easily converted to the rate of 40 per cent on original stock over ten years (which I prefer) and the results then are:

	Degrees per annum	*Higher Certificates per annum*	*Lower Certificates per annum*	*Total per annum*
Minimum	978	1 620	4 890	7 488
Maximum	1 800	2 800	8 820	13 420

There is a considerable degree of unreality about these figures. The projection based on the minimum Unesco projection produces a total annual output of teachers which is a lower average than the 1961 output, which was: degree, 481; Higher Certificate, 1,632; Lower Certificate, 5,695; total 7,808. Further, it is only just above the total probable wastage from 137,000 teachers. On the other hand, the higher estimate involves an output of degree graduates at the rate of 1,800 per annum in the decade 1961-70, which is in any case totally impracticable.

To deal first with graduate requirements in a simplified way, it might be assumed that all teachers in MS 4 and 5 and that 50 per cent of teachers in MS 1-3 should be graduate. The Unesco intermediate projection suggests 471,000 pupils in MS 1-3 in 1970 and 57,500 in MS 4 and 5. At a 30 : 1 pupil/teacher ratio this implies 15,700 teachers for MS 1-3 and 1,920 in MS 4 and 5, and a total of 9,750 graduates. To reach this stock by 1970/71 requires an annual output of 780 on the 40 per cent wastage basis. If the proportion of graduates in MS 1-3 is reduced to 30 per cent, which is not an unreasonable figure, the result becomes 460 per annum. These calculations omit teachers for vocational and teacher-training classes, for which about another 300 graduates per annum might be needed to provide rather less than double their present graduate strength. This suggests a target of 750 graduates per annum—a very steep rise, but a possible target for 1970.

As a provisional suggestion, I would assess a reasonable 1970 target for teacher output per annum as: degree, 750; Higher Certificate, 2,500; Lower Certificate, 7,000; total 10,250.

CONCLUSION

Thailand in 1960, a country with 82 per cent of population in agricultural pursuits, had accumulated a considerable educated class—nearly 30,000 men and women with four years of college education; nearly 100,000 who had had a touch of college work. Many of these had gained education for education's sake. The economy was not much industrialized or 'modernized' and education was not naturally regarded as a prelude to intensive training for some technical pursuit; if anything, it led to government service for men, private business and social service for women.

The basic strategy of the decade 1960-70 is to give this educated group and its new recruits a more modern, and to some extent technical training, so that, as it grows and spreads, it is also becoming the leadership of a society bent upon industrialization and upon modernizing its agricultural techniques. This involves a considerable deepening of the quality of education, a far greater emphasis on science, a wider application of practical training, and a wider distribution of the educated to rural areas. In particular, I must emphasize the very high target for science degrees.

For this reason, the proposals made here do not involve a rapid expansion of total enrolments in 1961-70, but a preparation for more rapid growth in 1970-80. For reasons given, I have adopted the lower estimates for expansion of secondary education (an average of about 15,000 grade 12 graduates per annum for post-secondary training in the late 1960s, plus 6,000 university entrants), which will give time for quality to grow. The suggested expansion of university output, rather higher than other estimates, is based, I believe, both on economic and social need (as the analysis of medical, teaching, engineering and scientific requirements shows) and also upon a belief that 30 per cent of the graduates of MS 5 will demand and should obtain the chance of university education. In briefest summary, the targets here suggested for average annual output are:

	1960-70	*1970-75*
University (80 per cent of Category I)	3 600	5 500
Secondary (100 per cent of Category II)	15 000	31 000
Add University entry	(6 000)	(10 000)

This assumes a university entrance of about 5,000 in 1963 and of about 9,000 in 1970. Once again, the Category II outputs are additional to the numbers entering the university.

I have suggested that university output in 1975 would be balanced as follows: science, 2,000; arts, 2,000; medicine (doctors), 500; agriculture, etc., 100; engineering, 450; education, 750; total, 5,800. The figure for agriculture looks extremely small, in view of the highest priority which it should share with teacher training in the national effort. But the Advisory Service is advisory, and a force of 700-800 good graduate officers in the field, supported by twice that number of diploma-trained men, should be ample for the field work. The massive numbers of research and specialist staff will be in large part produced, not by the Agriculture Faculty but from the science faculties. It is in the science faculties that heroic action will be needed to expand output.

Finally, the emphasis throughout is not on rapid educational expansion. It is upon training in practical application. It is not upon vocational schools, which are attempting to anticipate training, but upon good schools, in which science as well as other subjects is well taught, followed by in-service or special training.

Malaysia

Federation of Malaya

A high-level manpower survey, on the lines used in this report, is in process of completion in Malaya and some provisional results have been obtained. These results are used here in their crude form; but the further work which is being done will refine them. There is a good link between manpower work and educational planning through the Higher Education Planning Committee, and some (but not enough) linkage between that committee and the over-all economic planning for Malaysia. This machinery, if it can be kept working, and accelerated, should provide a good basis for policy making in both the economic and, more particularly, the whole field of higher education. This report is concerned primarily with four key sectors—agriculture, industrialization, health, and education. The construction industry, which is another sector of growing importance, would require a specialized study of its own.

THE ECONOMY

Population

From the 1957 census, the 'medium' fertility rate projection of population growth provided by the Census Department is:

	Malaysian	*Chinese*	*Indian*	*Other*	*All races*
1962	3 709 000	2 771 000	843 000	140 000	7 463 000
1967	4 381 000	3 282 000	1 014 000	154 000	8 831 000
1972	5 158 000	3 888 000	1 230 000	—	10 450 000
1982	7 130 000	5 502 000	1 851 000	—	14 703 000

The United Nations population median projection, for slightly different periods gives slightly lower total figures (all races): 1960, 6,965,000; 1965, 8,131,000; 1970, 9,499,000; 1980, 13,078,000. These figures assume an annual growth of 3.1 per cent (1960-65) to 3.3 per cent (1975-80). For purposes of high-level manpower calculations these differences are not greatly significant, and it is clear that rounded figures of 7 million, 1960; 8 million, 1965; and 9.5 million, 1970, will not be far out.

General economic growth problems[1]

During the last few years Malaya has been pushing ahead with a bold development programme while suffering a quite steep fall in the price of her biggest export, rubber. The key figures reflect this. Physical production has been growing, at rather more than 4 per cent per annum. But when the figures are translated into money terms, the fall in rubber prices has dragged the indices down. The effects are shown in value of *per capita* income, and in a large and possibly growing deficit both in the current budget and in the balance of payments. Development expenditure in the second half of the decade will be largely deficit spending.

In general, it is hoped to offset the expected continuation of fall in rubber prices by high total yields and higher yields per acre, so that the total value of the crop recovers to about M.$1,500 million by 1970 even on a price per pound of only 55 cents. Meanwhile, tin production has been increasing and tin prices have soared to boom levels, which helps to offset the loss on rubber. Deficits will have to be financed by foreign capital investment in industry, and by running down foreign reserves and increasing internal savings. The economy will go through a period of fairly acute strain, but it should be manageable, provided that defence expenditure does not have to rise too steeply.

In manpower terms, it is the investment side of the economy which matters. Provided that the deficits can be financed, development expenditure which has risen so steeply implies a heavy call on high-level manpower for technical services, supervision and administration. At lower levels, however, total employment responds more sluggishly to investment, and in 1962 the economy showed about 6 per cent of unemployment. This is not a disastrous figure, but it could be serious in social terms. Industry unfortunately absorbs

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[1] In general, optimistic targets for the economy, education and manpower are used throughout these national assessments. It is possible that Malaya is setting the targets too high and that both development plans and educational expansion will have to be scaled down somewhat in the next five years. Agricultural change, upon which so much depends, is notoriously slow-moving in the early years. Nevertheless, the targets of economic planning have been carefully prepared, with much greater knowledge than I possess; and the manpower estimates which follow are based upon them.

TABLE 17. Economic indices[1]

Index	1960	1961	1962	1963	$\frac{1960}{1962}$
					%
Gross domestic product (1959 dollars) (M.$ million)	5 191	5 458	5 672		109.3
Gross national product (market prices) (M.$ million)	5 665	5 604	5 786		102.1
GNP per capita (M.$ million)	819	783	785		95.8
Actual development expenditure (M.$ million)	201.4	350.5	544.9	600[2]	
Balance of payments (current account) (M.$ million)	+308	+14	−203	−209[2]	
Federal budget (surplus or deficit) (M.$ million)	+100	−70	−170	−370[2]	
Rubber price (cents per lb.)	108.1	83.5	78.2		
Rubber production (000 tons)	708	737	751	770	
Rubber value (M.$ million)	1 691	1 346	1 298		
All races retail price index (1959 = 100)	99.8	99.6	99.7	101.6[3]	

1. The figures are from *Interim Review of Development in Malaya under the Second Five-Year Plan* (Kuala Lumpur, December 1963).
2. Estimate.
3. July 1963.

all too little labour per unit of capital invested; the main hope of expanding total employment will be in raising the standards of living in the whole dispersed economy, generating a large number of jobs in rural areas and small country towns and settlements. Particular attention is therefore given in this report to land, agricultural and rural development.

In a broad sense, it will not be easily possible to continue the rise in physical output (which demands physical effort) without an accompanying rise in income per head, i.e., some real reward in purchasing power for the mass of people. Retail prices have remained remarkably steady, which is a good omen. Further, the ordinary man will be getting much improved social and environmental services—more education for his children, better roads and so on. But these cost money in the budget and are apt to be taken for granted by the consumer. Increased personal purchasing power will mean a higher GNP per head in terms not merely of infra-structure but of increased personal earnings.

It is clear that if the rubber programme maintains the value of output over some years, despite falling prices, positive growth in national income will have to come from other sectors. The two most likely are increased and diversified production of non-rubber crops: rice, palm oil, coconut, pineapple, tobacco, animal industry; and the industrial sector. It is also implied that very heavy capital investment on long-dated schemes—such as the FLDA land settlements, which give virtually no return to the settlers for five or six years—may add to the strain on the economy without any revenue or incentive effect through the most critical period.

THE EDUCATIONAL SYSTEM

Primary

Enrolments (1962): total primary, 1,133,269; standard I, 223,552; standard VI, 173,136; percentage of VI to I, 77.4.

Total by streams: English, 229,339; Malay, 487,246; Chinese, 354,366; Indian, 62,318; total 1,133,269.

The survival rate of entrants to standard I in 1956 to numbers in standard VI in 1961 was 74.75 per cent; it has greatly improved over the last seven years.

Secondary

Enrolments (1962): total secondary, 202,368; form 1, 60,008; form 5, 16,525; form 6(1), 1,132;[1] form 6(2), 990.[1]

Total by streams: English, 156,463; Malay, 14,534; Chinese, 31,371; total 202,368.

Two separate estimates[2] give the following rates of survival through secondary education:

1,000 boys and 1,000 girls enter form 1;
550 boys and 640 girls survive to form 4 after eliminating examination at form 3;
198 boys and 282 girls survive to form 6(1) after School Certificate at form 5;
147 boys and 200 girls survive to university entrance after Higher School Certificate at form 6(2).

Survival rate = 17.35 per cent.

The survival rate from form 5 to form 6 appears in practice to be considerably lower. For example, in 1962 from 6,119 entries to the form 6 entry examination, only 964 were assured of places (16.6 per cent) and 330 extra qualified for 'provisional' places, making a total of 22 per cent. This contrasts

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1. The inclusion of purely Chinese streams would more than treble the enrolments in forms 6(1) and 6(2); but from the point of view of university entrance the text figures are appropriate.
2. Ministry of Education and Mr. Doh Joon Sue, *The Estimated Student Population of the University of Malaya, 1962-1968* (Department of Economics, University of Malaya, December 1962).

with the 40 per cent survival from form 5 to form 6(1) suggested above. The Ministry of Education projections to 1977 are based on a survival rate from form 1 to form 6(2) of only 8 per cent.

University (Kuala Lumpur)

Total enrolment in 1962 was 1,331 (arts, 714; science, 317; engineering, 225; agriculture, 75). In that year 533 students were in their first year, so that not more than that number would graduate in 1965/66. Estimates of future enrolment total 2,612 in 1965 and 3,918 in 1968. Output of graduates for 1968 is estimated at 795.

SPECIAL REQUIREMENTS FOR HIGH-LEVEL MANPOWER

Agriculture

The strategic problems of agricultural development in Malaya are quite simply stated:

1. In the expectation of falling rubber prices, replanting of high-yielding varieties and extension of acreage (including land settlement schemes) will be used to increase output so that total financial yield remains as stable as possible.
2. It is therefore imperative that other crops should be developed to provide for economic growth—this effort is directed partly to new commercial export crops (oil palm, etc.) and partly to food crops (double-cropping of rice, improvement of single crop yields, development of animal husbandry, fruit, vegetables, canning and processing industries).
3. This programme will involve both a rapid and massive extension of agricultural field staff, and equally a large investment in research, especially on soils, varieties, crop and animal husbandry, and commercial/industrial techniques for processing and marketing: this involves expanding training at all levels.

In fact, Malaya is paying a price for over-concentration on rubber and a comparative neglect of the staff necessary to develop other crops.

The following figures for crop acreages in 1961[1] will illustrate the present position: rubber, 3,923,000; oil palm, 141,000; coconut, 439,867; paddy (all types), 932,000; fruit, 214,000 (pineapple, 42,000; durian, 34,000; banana, 66,000; rambutan, 24,000); other food crops, 136,000 (tapioca, 40,000); miscellaneous, 73,000 (nipah, 31,000; coffee, 16,700; tea, 4,500; tobacco, 7,628); spices, 47,000; total 5,907,594. Thus roughly 4 million out of 6 million acres is devoted to rubber, and nearly 1 million acres to rice.

Meanwhile various estimates of food consumption per household[2] show that average total calorie intake in Malaya is probably sufficient but that there are quite serious deficiencies in protective foods. Among the lowest income groups both calories and protective foods are short, the latter by as much as 50 per cent below an acceptable average.

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[1] Ministry of Agriculture report, 1961.

[2] Wharton, Thomson, Sedky, *et al.*

Further, Malaya is spending heavily on food imports, including about 35 per cent of rice requirements (see Table 18).

TABLE 18. Major food imports, 1960

Sector	Value, M.$ million	Percentage of total imports
Rice	134.8	6.3
Milk products	99.6	4.5
Sugar, etc.	67.5	3.1
Fruit and vegetables	62.9	2.9
Wheat flour	60.8	2.9
Meat	32.1	1.5
Fish and fish preparations	28.3	1.3
Animal feeding stuffs	28.0	1.3
Other (beverages, tea, coffee, etc.)	84.0	3.8
TOTAL	598.0	27.8

Figures which are particularly striking, apart from rice, are fruit and vegetables, meat, fish, and animal feeding stuffs, all capable of local production. Future difficulties in the balance of trade point strongly to local production in place of imports in these sectors. There is even some possibility of sugar-cane production.

As to rice, the main effort is to extend double-cropping, chiefly in Province Wellesley, where water is available, but later in Kedah, where up to 100,000 acres could be handled when a major irrigation scheme is put in. In 1963 there were about 26,000 acres under double-cropping in Province Wellesley. The programme was set back by the introduction of a round-grained rice for the second crop which was unpopular with consumers; a new variety without this disadvantage is being developed. There is also, in Kelantan, the possibility of using tobacco as a second crop; the financial return to the grower is extremely attractive.[1] The total area of double-cropped paddy is by 1964 probably around 45,000 acres, i.e., less than 5 per cent of all paddy acreage.

A major effort will be needed to develop other food and commercial crops, not only in the growing but in developing varieties suited to canning and market demand and uniform in quality; in replacing inefficient milling and processing methods, and in marketing.

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[1] We were informed that tobacco could bring in about M.$600 to the acre against second-crop paddy at about M.$150/200.

There are also large opportunities for animal husbandry (cattle, pigs, poultry) and for growing fodder crops, notably the leguminous crop with which young rubber is in any case under-planted. The fact that animal husbandry is separated off from Agriculture to the Veterinary Department has made it difficult for agricultural extension workers to develop mixed farming.

In face of such a large, varied, intensely interesting and hopeful programme of agricultural development, both the field and research staff have been wholly inadequate in numbers. In the Second Five-Year Plan, out of M.$545.3 million devoted to agricultural development, only M.$20 million was allocated to extension services and research. It is significant that from the same planning budget M.$166 million was allocated to rubber replanting and M.$91 million to land development.

The schemes of the Federal Land Development Authority (FLDA) have absorbed a huge proportion of money and effort. They have their own justification, in catching up with the war-time and emergency arrears of land alienation, in extending cultivable acreages, in providing land and employment to a small part of a growing population, and in providing a cash-crop to farmers off 10-acre holdings which are designed to give both vegetables, a fruit crop and a cash income of about £500 per annum per family when the rubber (or palm oil) is fully developed. By the end of 1963 schemes covering 200,000 acres, designed for 15,000 settler families were in hand, with nearly 70,000 acres of rubber planted out of 154,000 due for planting (30,000 to Dusun)—nearly 6,000 families were by then resident. The programme is for twelve schemes of 4,000 acres per annum, each settling 400 families. In view of the relatively small population which can be affected, the long-term nature of the yield (the families have to be paid subsistence as a loan until fruit and then rubber crops come into bearing), the need for more research on the main crops in the scheme, the heavy financial strain on the Malayan economy during 1965-68 and the urgent need for investment in other types of agricultural development, it is questionable whether the balance of effort and investment is right. It should be added that land alienation and settlement is proceeding rapidly under less thorough-going schemes. Figures show 22,000 settlers and 92,000 acres planted under 'fringe alienation' and 12,000 settlers with 44,000 acres planted under 'controlled alienation'.[1] The following proposals on manpower will assume that, in any case, the new investment in diversification will take place, although in competition for funds with FLDA, and therefore that the additions to agricultural staff, which are essential for it, will be authorized.

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[1] *Interim Review of Development in Malaya under the Second Five-Year Plan* (Kuala Lumpur, December 1963).

This emphasis on crop diversification should not, however, overshadow the immense achievement of the rubber industry in driving the crop up to record figures (about 770,000 tons in 1963) and in replanting (about 500,000 acres of small-holder rubber have been covered since the replanting schemes were started). A milestone was passed when 3,000 lb. of rubber was harvested from a single acre in 1963.[1]

Detailed consideration has recently been given by the Government to the strength of the advisory and research staff, and decisions may by now have been reached. The suggested expansions are shown in Table 19.

TABLE 19. Suggested establishment for advisory and research staff

Category	Div. I: agricultural officer, research officer, agronomist, etc.		Div. II: agricultural assistant, laboratory technician, etc.		Div. III: junior agricultural assistant, laboratory assistant, etc.	
	Present	New	Present	New	Present	New
Field staff	15	38	105	262	436	1 666
Research staff	48	199	50	398	200	1 194
TOTAL	63	237	155	660	636	2 860

At the graduate level, there are other branches with research and some field staff, of which the Rubber Research Institute and field staff are by far the most important (see Table 20).

TABLE 20. Other research and field staff

Branch	Div. I	Div. II	Div. III
Rubber Research Institute, etc. (1963)	101	31	180
Forest Research Institute[1]	12+		
Veterinary Research Institute headquarters (and field staff)	17	10	(?120)
Fishery research and field	17	(?40)	(?100)
	147	(?80)	(?400)

1. Total forestry staff, 1960: Division I, 39; Division II, 37; Division III, 214; Division IV, 633.

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[1] This was reported by the Rubber Research Institute from an experimental crop of clone 600. This clone has been in cultivation by farmers and estates for some years, and yields of 2,500 lb. are becoming widespread; in some areas 3,000 lb. may have been harvested.

If these posts, all of which require biological background and applied training, are added to the new agricultural proposals, the result is: Division I, 384; Division II, 740; Division III, 3,260. This does not include the teaching and research staff at the university (about 20) and at Serdang, nor the forestry field staff. Nor does it allow for expansion in the Rubber Research Institute, and forestry, etc., staffs.

While Malaya certainly needs a large expansion of staff, these figures, and especially the agricultural research figure, look somewhat high for a country of Malaya's population. The additions would, of course, be phased over a ten-year period. Moreover, the figures are swollen by the inclusion of all research staff under 'agriculture', whereas in many countries they would appear under a university or special research institution. It is true that behind every graduate field officer there needs to be an output of at least three biological degrees, concerned with the whole agricultural field; and including research, teaching, marketing, processing, and commercial management (supply and services).

It will be clear (see below) that these total figures, with additions to the rubber and veterinary staff which are sure to be called for, cannot in any case be reached in five years from local output; they might quite reasonably be regarded as a fifteen-year target. It might be sensible to suggest, as a target for the early 1970s, the approximate figures given in Table 21.

TABLE 21. Suggested target for the 1970's

Category	Div. I	Div. II	Div. III
Field	40	260	1 250
Research	120	300	800
	160	560	2 050
Add:			
Rubber	120	60	300
Other, and teaching	70	100	150
TOTAL	350	720	2 500

It would be time enough to review these figures in 1967, with a view to expansion, if necessary, in the decade 1970-80.

The annual outputs to maintain a force of this size in the field, assuming a 20-year life on the job (5 per cent p.a. wastage),[1] would be 17 per annum for Division I, 36 per annum for Division II and 125 per annum for Division III. In fact, however, since wastage is likely to be much higher in

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[1] A higher wastage rate is used here, because field staff in outlying districts are hard to retain in the service.

Division I owing to expatriates leaving on retirement and to the engagement of officers on short contracts, the wastage rate for Division I is likely to be far higher in the early stages. Moreover, these figures make no allowance for providing trained staff to the private sector, to processing and industrialized concerns in the food industry, and to new research units which will no doubt be developed. There will also be a drain of experienced diploma-level staff for management of FLDA settlement schemes, at a rate of about 12 new posts per annum. It would be reasonable to aim at an output of 35 per annum for Division I, 50 per annum for Division II and 120 per annum for Division III (where wastage is not likely to be so great). These figures are for maintenance only.

To reach the stock figures reasonably quickly requires, temporarily, a much higher output. This can no doubt be achieved for Division III, since facilities for training can be readily increased. Division II staff are trained at Serdang College of Agriculture, which has recently been expanded to take 120 students, with School Certificate entry. If the college can increase its output to 100 per annum by 1968/69, it should be possible at a later stage to devote some of the facilities to training a better level of Division III staff and to add a year to the diploma-level (Division II) course, thus reducing the candidates for Division II posts which, by 1970, might not absorb more than 50 per annum at most.

At the university level about 100 students in all were enrolled in 1963, providing a maximum output from the four-year course of about that number by 1967/68. Thereafter, it should be possible to increase the output from the present faculty to about 35 per annum. Since a high proportion of research staff should come from the Faculty of Science (botany, zoology, chemistry, etc.), it would appear that, in the longer term, this output would be sufficient. But the faculty would certainly wish to develop, in association with the Science and Engineering faculties, a strong post-graduate school. In general, it would be a mistake to emphasize the first degree of the Agricultural Faculty as the dominant source of staff for agriculture. A very practical and high-quality college for field training at diploma level, first-rate departments of botany, zoology, chemistry, etc., in the university, good post-graduate schools and research institutes will, in the future, be just as essential as an output of B.Sc. (Agriculture) graduates.

Suggested annual outputs are shown in Table 22. In the meantime, quite extensive engagement of contract expatriates, and an expansion of scholarship programmes for local candidates will be needed.

Engineering, technical, commercial, management

Engineers. The 1963 Survey of Key Occupations listed 1,977 engineers in Category I;[1] a high proportion of these would be expatriates at the present

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[1] Items 1-11 and items 34 and 35.

TABLE 22. Suggested levels of output, per annum

	1970	1975
University		
Faculty of Agriculture, first degree	25-30	35
Faculty of Agriculture, post-graduate	10	15
Science Faculty, agricultural bias	70	100
Serdang College	100	50[1] 50[2]
Division III training	200	100

1. Diploma three-year course.
2. Improved Division III two-year course.

time. The University in Kuala Lumpur had an output of just over 20 in 1962, estimated to rise to about 100 in 1968. The total produced over that period would be about 410. An output of 100 per annum would sustain a force of 2,500. The force of engineers should, however, rise fast over the next ten years, if possible 100 per cent by 1975, i.e., 4,000. Some engineers of professional level will come from the Technical College—perhaps one-fifth of its present total output of 100 students of all grades per annum. It is clear that no help can come from Singapore, where the facilities are fully engaged for its own needs; and eventually Malaya should be training professional engineers for Sabah and Sarawak, assuming that technicians will be trained on the island. An output of 200 engineering qualifications at professional level per year would seem a minimum target, to be realized as soon as possible. This in fact implies a new engineering school. It is true that the faculty in Kuala Lumpur will have an enrolment of 750-800 in 1968, and therefore an output of 150 or more in 1972. But this is about the limit of size, and the target will continue to rise.

Technicians. The 1963 survey lists 4,300[1] technicians on the industrial side, including pharmaceuticals, and 620 in survey, architectural drawing, town planning, printing and cartography—total, say, 5,000. This would require an annual output of 200 to maintain and of as much as 500 to increase to the levels required in the 1970s. At least one more full-scale technical college will be needed, assuming that the existing college in Kuala Lumpur can raise its output to 200 per annum, which should not be impossible, and that departmental schemes are maintained and increased. There would be a strong case for placing such a college in north-west Malaya—Ipoh or Penang.

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[1] Items 1-6, 1[illegible], 12, 13, 15, 17, 20.

In addition, more upgrading of artisans through technical evening classes could be organized in co-operation with industry. The scale of the new Ministry of Labour training centre in Kuala Lumpur might well make it worth while to use it for higher than artisan training, at least at night. Even with these additions, a third technical college may well have to be considered.

Architects, surveyors, quantity surveyors, town planners. At graduate level, 244[1] were listed in 1963. Malaya will presumably rely partly on overseas courses, and occasional students accepted in the Singapore course when it reaches professional level. The Technical College should be able to produce the necessary supply of Category II technicians and draughtsmen, and already produces architects up to the RIBA Intermediate standard. Surveyors and quantity surveyors are bound to be in short supply (the latter are always rare in developing countries) and it may be necessary to make expanded scholarship arrangements to prevent a serious bottleneck arising here as the development plan proceeds.

Commercial. The 1963 survey lists 821 accountants, auditors, company secretaries and bank officers in Category I and 1,786 book-keepers in Category II. These figures, however, do not cover a quarter of the senior commercial and industrial posts, nor a tenth of the Category II posts, which are covered in the over-all survey. The Rural and Industrial Development Agency College in Kuala Lumpur has residential accommodation for 50 girls and about 120 men and had an enrolment of 154 in 1962,[2] evenly divided between courses in accountancy, secretaryship, 'general business' and stenography; the Technical College does not cover commercial subjects. In fact, most young Malayans learn their commercial skills on the job, sometimes under a good company training scheme, sometimes (more often) haphazardly. It is important that government should not saddle itself with the responsibility for complete commercial training—stenography, for example, can well be undertaken by private enterprise—but also that it should aid industry and commerce in their training programmes. The RIDA College is too constricted in site to expand largely; but there is surely room in Kuala Lumpur at least for a thriving commercial college, running a small group of full-time courses in certain definite skills—accountancy is one—and a very large programme of evening and day-release courses. It is from this area of evening-class work that most managers and executives are going to come.

Management. Managers are mainly produced by promotion from the ranks: but much can be done to help them enter the more senior ranks. The establishment in 1962 of a National Productivity Centre, with ILO assistance, in

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[1] Items 12-16; 57 architects, 136 surveyors.
[2] 175 in July 1963.

Petaling Jaya should be immensely valuable in supervisory and management training. It is already running courses for senior and middle management in production, marketing, management accounting, etc., and for the supervisory level. There are proposals for courses for trade unionists, Malay contractors and many other groups. The centre has all the signs of energy and of acceptance by industry and commerce, and should fulfil a vital training role. Expansion of these activities would at present be much more valuable than any attempt to create a university department of commerce or business administration.

Artisan training. It remains to say that good artisan training is as important as the training of technicians; many technicians are, in fact, improved and promoted artisans. There will be an abundance of manpower with a background of education at least to form 3 and later to form 5. While all developing countries, owing to the small number of large employers, have had to create government trade schools, they are seldom satisfactory. Training centres associated with industrial estates (Johore, Kuala Lumpur, Ipoh, Butterworth, with close relations with local employers) would probably meet the need, but very great care will have to be taken in training instructors.

Health services

Statistics of government health staff in 1963 are:[1] 451 doctors, 111 dentists, 21,747 hospital beds, 2,221 nurses, 122 dental nurses, 1,323 assistant nurses, 1,038 hospital assistants, 1,153 midwives, 269 health inspectors.

The fuller figures of the Medical Department for 1959 give a better picture of the detail of the public and private service (see Table 23).

TABLE 23. Doctors in the public and private health services

Service	European	Indian	Malay	Chinese	Other	Total
Government	118	229	29	84	11	471
Private	135	145	20	236	20	556
TOTAL	253	374	49	320	31	1 027

At 1959, therefore, there was roughly one doctor to 7,000 population. Total dentists were 133, with 473 dental assistants. In addition to the nursing and other staff quoted above, there were 745 other medical staff at technician level, including radiographers, pharmacists, dispensers, anti-malaria inspectors, etc.

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[1] *Review of Development*, July 1963.

Provision for training at the level of nurses and technicians appears to be adequate and keeping up with demand. However, at the level of doctors and other graduate medical staff, Malaya is dependent upon Singapore (providing about 30 per annum) and overseas scholarships. The new Medical School in the university is expected to produce its first medical degrees in 1966, with an output reaching 40 in 1968 and rising to 100 (enrolment by 1968 should be over 600). About 20 dental surgeons and 15 pharmacists will emerge from the university (the dentists in 1967, the pharmacists in 1965).

Medical schools are so expensive and difficult to staff that quite clearly they can only be considered in relation to Malaysia as a whole. Total population in Malaysia by 1975 is estimated as: Malaya, 11.1 million; Singapore, 2.6 million; Sabah and Sarawak, 1.9 million; total 15.6 million. To achieve a proportion of 1 : 5,000 population would mean creating a total force of just over 3,000 doctors. The arithmetic is quite simple, in round figures:

1960 stock (all Malaysia)	*Wastage 60 %*	*Required total 1975*	*Additions required*
2 000	1 200	3 000	2 200

These figures imply a required annual average output of 150 doctors. They are conservative in estimating for only a 4 per cent annual wastage, since so many doctors are at present expatriate; and in setting a doctor/population ratio which is, indeed, better than Malaya's but half as good as the current ratio in Singapore. However, the private sector will certainly be recruited from doctors trained overseas (Taiwan, India) under private arrangements and the public sector by returning scholarship students. Soon after 1970 Singapore and Kuala Lumpur will be producing nearly 200 doctors per annum. It would therefore seem that the two medical schools will be enough to meet minimum requirements. A decision to aim at a proportion of 1 : 2,500 by 1975 (6,000 doctors) would involve an output of 340 per annum, and this certainly implies the foundation of a third medical school; three Medical schools to 15.5 million population would certainly not be extravagant, having regard to Malaysia's national income.

Teachers

At 31 January 1962 there were 45,954 teachers in assisted schools and 3,193 teachers in private schools.[1] They were divided as follows: primary, 40,797 (plus 1,168 private); secondary, 5,157 (plus 2,025 private). In the assisted schools, the types of teacher were divided by the following categories: A = university graduates; B = college/normal trained; C = day training college, probationer, etc.; D = untrained (see Table 24).

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[1] Department of Education, Kuala Lumpur.

TABLE 24. Teachers in assisted schools, by category

Category	Primary	Secondary	Total
A	64	772	836
B	3 713	3 423	7 136
C	29 548	250	29 798
D	7 472	712	8 184
TOTAL	40 797	5 157	45 954

About 850 teachers were admitted to the two-year post-School Certificate courses in teacher-training colleges in Malaya in 1963, and there is a rather larger output from three-year post-form 2 courses. An over-all total of 50,000 primary school-teachers would require an annual output of 2,000 if every teacher remained in service for 25 years—a very high average life in teaching posts.

At the secondary level, to staff the 1963 forms 4, 5, 6(1) and 6(2) with university graduates would require about 1,600, of whom only 772 were available in 1962. These forms will be expanded, on present estimates, from 39,000 (1963) to 61,700 in 1970 and 93,000 in 1975. The requirement is therefore a graduate teaching force of about 2,400 in 1970 and over 3,000 in 1975. This implies that Malaya ought to be finding over 200 new graduate teachers every year up to 1975. This does not include teachers for forms 1 to 3, which are likely to have a far greater expansion if the decision to abolish the primary leaving examination is matched by the offer of places to all leavers in some type of secondary school.

The natural emphasis on existing developments in agriculture and industry perhaps tend to obscure what is the largest task and the first and highest priority in the Malayan manpower situation—the provision of secondary school-teachers. Without enough, and of good quality here, the universities cannot work effectively, agriculture will not get its field and research staff, the school system itself cannot expand. Teachers are, as Professor Harbison has so often said, the seed corn, and they must be saved from the crop, even if the family goes hungry.

There are probably 1,000 arts students and 350 science students enrolled in the university in 1964. There are a multitude of calls on the scientists, but it needs serious thought whether there is any field in which arts students are more needed or could serve Malaya better than in teaching. It is pleasant to have historians and political scientists and degrees in literature, but not at the expense of next year's crop. It may well be argued that the university is failing in its task if it does not lay plans to produce 200 graduate teachers per year, and that society is failing if it is not willing to pay them adequately.

So many students are already launched on a course that initially the additional qualification for teaching may have to be given in a fourth, postgraduate, year. It may also be possible to start a three-year (B.Ed. or B.A.Ed. or B.Sc.Ed.) course to multiply numbers in the education stream. The vital qualification for a senior secondary teacher is a wide general knowledge of his subject and a lively interest in it. The minor techniques of teaching can be quickly learned and are often over-emphasized by education departments.

It is therefore recommended that the university review its plans for the production of teachers with urgency and determination. Science teachers must be borrowed from abroad for long enough—the more reason to see that some of the small output are encouraged to teach now. There should be enough arts students, even when the needs of the central administration are met, to man the secondary-school arts streams. It is easier to borrow even economists and statisticians than to borrow good teachers who can give continuity and standards to the senior secondary system upon which the whole manpower policy of Malaysia depends.

GENERAL HIGH-LEVEL MANPOWER PROJECTIONS

The 1963 Survey of 'High-Level' Manpower carried out in the Federation showed stock in 1963 and estimates of requirements to 1971. It is clear that the 1971 estimates were impossible to make in terms of real anticipated requirements in the absence of a plan and owing to the general impossibility of foreseeing economic conditions eight years ahead (by which time employers not yet in Malaya will be established and requiring staff). The provisional results of the survey were as follows:

A. KEY OCCUPATIONS

	Category I	*Category II*	*Total*
1963	6 988	20 536	27 524
1966 (estimate)	10 203	25 850	36 053

B. OVER-ALL TOTALS

1963	11 945	34 288	46 233

It is clear that the over-all totals in particular are too low. Medical and dental personnel were omitted, and for this an addition of 1,500 Category I and 5,000 Category II must be made.[1] There are some other categories (e.g., armed forces) which would have to be added (400 Category I, 1,000 Category II?). The agricultural sector may well have been 'downgraded' somewhat. The key occupation lists give only 378 Category I estate managers and

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[1] 1957 census: 1,498 doctors, dentists, etc.; 10,775 nurses, midwives, hospital assistants, technicians and other professional staff (say 50 per cent Category II).

132 in Category II. The 1957 census gives, in the agricultural sector: 'estate owners, managers, assistant managers, etc.: 3,600; conductors, 2,608'. It is clearly absurd to suggest that in the whole of Malaya the sum total of those who own and manage agricultural estates amounts to only 510, including Category II personnel.

A rough analysis of the 1957 census by occupations suggested figures of 13,500 for Category I and 48,000 Category II.[1] If this is projected forward by six years to 1963, assuming 25 per cent wastage over six years and a gross addition of only 35 per cent in six years for Category I, and 50 per cent in six years for Category II, the result would be as follows:

Category	*Stock 1957* *(1)*	*Wastage (25 %)* *(2)*	*Growth* *(3)*	*Stock 1963* *(1 − 2 + 3)*
I	13 500	3 375	4 725 (35 %)	14 850
II	48 000	12 000	24 000 (50 %)	60 000

It is clear that the Category I figures for 1963 should be around the level of 15,000, or possibly 16,000 if all groups are included and if a more generous classification of agricultural managers is assumed. There is, however, a wider gap in the Category II figures, partly accounted for by the omission of medical personnel, armed forces and possibly some others, partly by the agricultural classification, partly by the inevitable differences where classification is so inexact, particularly in the commercial field.[2] I believe a figure of 60,000 is nearer the mark for jobs which should by now be filled from candidates with secondary education and further training.

To reach a figure of target stocks by 1970, by purely numerical projection, assuming 25 per cent economic growth and 50 per cent Category I and 75 per cent Category II additions over seven years, the figures are as follows:

Category	*Stock 1963* *(1)*	*Wastage (25 %)* *(2)*	*Growth* *(3)*	*Stock 1970* *(1 − 2 + 3)*	*Annual output required*
I	16 000	4 000	8 000 (50 %)	20 000	1 143
II	60 000	15 000	45 000 (75 %)	90 000	6 430

To test the reasonableness of these figures, it may be noted that the result is to add only 6,500 to the 1957 census Category I stock over the thirteen-year period since 1957 (52 per cent) and 42,000 to Category II stock (90 per cent). The total growth for Category I plus II is just under 80 per cent. If the same relationship of growth in Categories I and II respectively were

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1. The full analysis was: Category I, 13,500; Category II, 48,000; Category III(a) clerks, sales, etc., 253,500, III(b) artisans, etc., 207,000; Category IV, 1,643,000; total: 2,165,000 = total economically active.
2. For example, the census gives under 'administrative, executive and managerial' occupations (excluding retail and agriculture) 19,443. But how many in each category? This could only be analysed by close analysis of size of firm, turnover, etc. I assumed 1,000 in Category I and 6,000 in Category II.

applied to a higher rate of economic growth (say 35 per cent over seven years), the numerical result would be roughly 23,400 Category I and 105,000 Category II, a total of 128,000; the annual outputs (average over seven years) would be respectively 1,600 and 9,000.

Totals of 110,000 Categories I and II or 128,000 Categories I and II would represent 1.1 per cent and 1.3 per cent of 1970 population respectively. The higher figure is a reasonable target, representing just over double the 1957 total; it would imply that in the 1970s an output of over 2,000 a year to maintain and increase Category I and about 12,000 a year for Category II would be needed.

EDUCATIONAL IMPLICATIONS

It is clear enough that an output of trainable students of 12,000 per annum from form 5 should easily be possible in the 1970's. Ministry of Education estimates for enrolments in form 5 were (in 1963, assisted schools only): 1967, 20,900; 1972, 26,800; 1977, 39,900. This leaves ample room for, say, 50 per cent falling gradually to 40 per cent to fail the School Certificate examination (a considerable improvement) and 25 per cent of passes to enter form 6(1), leaving nearly 8,000 School Certificate holders in 1967, 12,000 in 1972 and 18,000 in 1977 available for on-training.

Recruitment to Category I, if it is assumed to be made up as to 80 per cent of college graduates (university or professional technical college courses) is far more difficult. Even for a very moderate growth in the period 1963-70 an average output of about 1,000 per annum would be needed. This is certainly not in sight at present from the University and Technical College put together. The university has an expected output of 800 by as late as 1968. It is clear that every possible effort must be made to increase university entry in the immediate future. It is estimated[1] that 2,250 students will be enrolled in form 6(2) by 1967 and this would create pressure for a university entry of well over 1,500 in 1968, rising to 2,000 by 1970 and to nearly 3,000 by 1972. The sequence can be set out as follows:

	Form 5	*School Certificate passes*	*On-training*	*To form 6(1)*	*University entry*
1965	16 000	8 000	5 750	2 250	1 500
1966					
1967	20 900	10 500	7 875	2 625	1 800
1968	21 500	11 000	8 250	2 750	2 000
1969					
1970	24 000	14 000	10 500	3 500	2 750
1971					
1972	26 800	16 000	12 000	4 000	3 000 plus
1973					
1974					

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[1] Ministry of Education; excluding purely Chinese streams.

It is clear from these figures than an extremely rapid acceleration in university entry would be necessary to achieve the 1970-75 targets. A new university college with an entry of 300 students in 1967 and a second new college in about 1971/72 would give figures of:

Entry 1967 Kuala Lumpur 1 200 +1 new college 300 = 1 500
Entry 1970 Kuala Lumpur 1 500 +1 new college 500 = 2 000
Entry 1972 Kuala Lumpur 1 800 +2 new colleges 900 = 2 700

The figures would imply a total university population of about 6,250[1] (3.5 years' entry) in 1970 including the 1970 entry, and of about 8,000 in 1972 and of 10,000 in 1975, with an output of graduates rising from 1,250 in 1970 to 2,500 in 1975 and 3,000 later in the decade. The 1975 population would be distributed between Kuala Lumpur (6,500), first new college (2,000) and second new college (1,500).

These figures represent only a 'model' of what would be necessary to achieve the output figures at School Certificate and university degree level required by the suggested rate of manpower growth. To achieve such a target involves overcoming many difficulties in the educational system, in particular the problems of language, the recruitment and training of Malay-stream teachers and of graduate science teachers in secondary schools. It involves a considerable improvement in School Certificate performance. It involves great expansion of post-secondary training facilities. It involves heavy financial outlay. But the greatest difficulty of all will be the recruitment of secondary and university teaching staff adequate for the student populations envisaged. Staff in such numbers cannot be found within Malaysia at present. It follows that they are likely to be English-speaking. To insist on Malay as the only university language of instruction would be to abandon such a programme.

Whether this programme is desirable or necessary is for the Government to judge. It is certain that decisions already taken to enlarge secondary education will be followed by enormous pressure for more university places; and that a university population of 10,000 in the early 1970s is a relatively modest programme in terms of Malaya's estimated population of 10 million by then —it is just one-tenth of 1 per cent—and of the mainland obligation to assist Sabah and Sarawak.

CONCLUSION

There are three strategic areas in which Malayan manpower policy requires adjustment.

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[1] 1970 students in Kuala Lumpur might be: arts, 1,700; science, 850; engineering, 850; medical, 800; dental and pharmacy, 300; agriculture, 150; education, 600; total: 5,250. The new college would have about 1,000.

First, a greater concentration on food production and diversification of economic crops, involving a large increase in field and research staff.

Second, primary and secondary education have been expanded to ratios which have outrun university provision. It is suggested that one new university college is needed by 1967 and a second by 1971/72.

Third, and of highest priority, existing and planned production of graduate secondary teachers is far below requirements; a clear and determined decision is needed to guide students into teaching and to reward them adequately, even at the expense of output in certain subjects which have a value in themselves and will come into their own when—and only when—the foundations of manpower production have been well laid in the secondary schools.

Singapore

Both the Government and the university in Singapore are extremely alert to the need for manpower investigation and planning. A small unit in the university Department of Economics is engaged on detailed survey, and within government a Manpower Committee, with links with the university, has been working for some time. It would therefore be unnecessary and, indeed, futile for this report to attempt detailed numerical estimates on the basis of two very short visits to Singapore and limited published material. Moreover, while in small or predominantly rural economies, government staff represent a large proportion of all high-level manpower, and can be fairly easily counted, Singapore is a major commercial and growing industrial economy in which skill is widely distributed among a multitude of small enterprises. Further, as always in the commercial sector, it is not easily related to educational attainment. Only the next census will give an accurate over-all picture of the progress made since the census of 1957.

This note, therefore, will set out only some bare economic and educational indicators, for comparison with other countries, a very rough over-all proportion of high-level manpower based on the 1957 census, and some general comments on policy and training in certain limited fields.

THE ECONOMY

The population of Singapore is estimated at 1,714,000 in 1962. Various projections have been made for the future; that adopted in this report is the lower[1] United Nations projection giving a population of 2,183,000 in 1970 and about 2,320,000 in 1972. This assumes a population growth rate of 3.3 per cent in 1960-65 and of 3.2 per cent in 1965-70, somewhat lower than figures assumed for purposes of the Government Development Plan.

Gross domestic product (GDP) is not published, but total consumption in 1962 was unofficially estimated at M.$2,502 million. This gives a *per capita* consumption of £176 per head. National income is estimated to have grown by about 13.9 per cent between 1960 and 1962.

Distribution of the labour force by occupation is given (1957 census) as follows: manufacturing, 66,754 (14.0 per cent); commerce, 121,533 (26.0 per cent); services, 161,280 (34.2 per cent); Transport, 50,347 (10.6 per cent); construction, 24,628 (5.2 per cent); agriculture, 40,151 (8.5 per cent); mining/public utilities, 7,135 (1.5 per cent); total 471,828. A separate estimate of employment in the entrepôt trade is 71,362.

The chief internal economic problem of Singapore is that of providing

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[1] Excluding immigration, which may rise to 0.9 per cent per annum. This projection is based on normal mortality and moderate fertility decline (1 per cent per annum).

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employment for its rapidly growing population. As a free port, it has difficulty in protecting infant industries (though this will alter slightly within the Federation of Malaysia), and it is open to efficient competition from Japan and Hong Kong. Its basic solution to this problem is to develop such special skills as to attract both trade and capital investment. 'Confrontation', which has hit the trading sector, has given a great stimulus to the development of industrial enterprise, already foreshadowed by the 1961-64 development planners; in the long run this stimulus will have proved highly beneficial. It was estimated in the plan that about 80,000 jobs would have to be generated to absorb unemployment. To do this, a capital investment rate of 20 per cent of GDP was demanded in the plan. Much of this investment is in the highly successful low-cost housing programme; but high hopes are placed on the industrialization plans and particularly on the development of Jurong Industrial Estate.

By early 1964 the Jurong Estate, of 9,000 acres and with direct deep-water access, was virtually assured of success. Apart from a large number of smaller light industries, several major undertakings were starting or agreed. These included a M.$25 million Caltex lubricating-oil blending plant; a M.$1.5 million Singapore galvanizing plant (shared with Japanese capital); plans for an electric-battery factory and a sugar refinery; a large tyre factory of about M.$20 million (part-Malaysian, part-Japanese) called Bridgestone Malaysia; and a M.$23 million shipyard with floating dock, dry dock and building dock, again with Japanese and 49 per cent Singapore capital. The National Iron and Steel Mills have been established since 1963 and are now working almost to full potential. These enterprises, combined with many smaller ones, form the nucleus of an industrial complex which could be outstanding in South-East Asia. The Economic Development Board has acted with vigour and efficiency, and there are suggestions that such a board should operate for Malaya and Singapore together.[1]

It follows that the development of industrial and construction skills must have the highest priority in Singapore manpower policy.

THE EDUCATIONAL SYSTEM

Enrolments in 1961 were: all primary, 307,891; primary VI, 39,259; all secondary, 66,478; secondary 4,[2] 11,089; pre-university 2, 481. The survival rate, primary I-VI is 67.2 per cent; about 61 per cent of primary leavers enter secondary 1. The English stream in secondary education accounts for 40,000, the Chinese stream for 22,000, the Malay stream for barely 2,000.

The number of university applicants is now rising sharply, since the conversion of the Chinese JM I to SM 3 secondary system to match the 4-plus-2-year English stream (junior secondary 1 to 4; senior secondary 1 and 2—pre-university or sixth forms).[1] This will bring far more students from Chinese-stream primary schools directly to university entrance. It was estimated that about 1,800 students (650 Chinese stream, 750 English stream, 250 from Malaya and 250 from overseas) would apply in May 1964, against an entry of only 625 in 1963. Uncertainty about the university budget makes it doubtful how large the entry can be. In 1961, School Certificate entry was 6,883 (3,024 passes), SM 3 examination entry was 4,308 (1,642 passes), Government Secondary IV examinations entry was 2,958 (1,635 passes).

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[1] Other major plants include motor assembly, flour milling, fertilizer, rayon textiles, cement, veneers.

[2] 9,192 in Secondary 4 plus, 1,897 in Chinese Senior Middle III.

The 1961 figures for teachers were: 9,051 primary, 1,218 'full',[2] 1,776 secondary, and 78 technical/vocational, a total of 12,123. Of these, only 1,318 were without secondary education. The distribution of the 1,776 teachers in secondary education is as follows:

Training: 1,294 are trained, 128 are in training, and 354 are untrained.

Education: 668 are graduates (including 224 untrained), 1,068 have secondary education (128 untrained), and 40 are without secondary education (2 untrained).

By all South-East Asian standards this is a high level of training; but it is clear that more graduate teachers are needed in secondary schools; the urgency of this need has been stressed in all these studies. This gives added importance to the full and rapid development of the Education Department in Singapore University.

MANPOWER PROJECTION

A rough analysis of the 1957 Census figures for distribution of the labour force by occupation gave the following result: 11,000 Category I; 35,000 Category II; 64,000 Category III(a)—clerks, etc.; 90,000 Category III(b)—skilled workmen; 280,000 Category IV; total 480,000.

If for Categories I and II a wastage rate of 40 per cent in ten years is assumed, and an economic growth of 45 per cent, Category I growing at twice that rate and Category II at three times that rate (i.e., by 90 per cent and 135 per cent respectively), the numerical result is:

Category	*Stock 1957 (1)*	*Wastage (40 %) (2)*	*Addition to stock (1967) (3)*	*Total output required (2+3)*	*Per annum*
I	11 000	4 400	9 900	14 300	1 430
II	35 000	14 000	47 250	61 250	6 125

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[1] The original Chinese system was junior middle 1-3, senior middle 1-3. But SM 3 was not equivalent to pre-university in the new system.

[2] Combined primary and secondary.

If this is again projected to 1972, the result is:

Category	*Stock 1967*	*Wastage (20 %)*	*Addition to stock (1972)*	*Total output required*	*Per annum*
I	20 900	4 180	9 405 (45 %)	13 685	2 740
II	82 250	16 450	55 150 (67 %)	72 600	14 500

It is clear that estimates of growth in this order of magnitude could barely be achieved through the educational system. The total outputs at university level between 1957 and 1965 will be ascertainable soon after this report is available. The output of Nanyang University was 344 in 1961, and of the University of Singapore 376,[1] total 720. The total output in the decade 1957-67 might be 8,000. This covers a quite high proportion of the 14,000-odd required for Category I, allowing that it will be recruited both from technical colleges and from men with lower educational background who succeed in business. The rate of output per annum 1967-72 might rise to 2,000, assuming that the University of Singapore had by then 5,000 students enrolled and that the output from Nanyang and the Polytechnic continued to rise. This would still be 700 p.a. below the projected rate of expansion of Category I.

At School-Certificate level the strain would be even higher. Output should certainly have risen to over 6,000 p.a. by 1967, but it is impossible to suppose that they could achieve 13,000 five years later. It would be more reasonable to suggest that by 1972 the stocks of Category I and Category II manpower would reach about double the Category I and treble the Category II figures of 1957, i.e., in 1972 Category I, 25,000 and Category II, 100,000. (It would require an output of 3,000 p.a. for Category I and 16,000 p.a. for Category II in the next decade to raise the stock by 80 per cent and 120 per cent p.a. respectively and to replace wastage.) A total of 125,000 high-level manpower would represent over 5 per cent of total population in 1972, which is an extremely high proportion. It is, however, taking by itself a concentration of skills in a single large city which in fact have to be shared with the whole economy of Malaysia. The total figure for Malaysia as a whole (2 per cent) gives a more sensible picture.

TECHNICAL EDUCATION AND INDUSTRIAL TRAINING

There are four main types of formal, government-sponsored technical education in Singapore.

1. *Secondary technical schools.* The 1961-64 plan envisaged the creation of six secondary technical schools between 1962 and 1964, but this proposal may now have been modified. These are particularly difficult schools to manage, always in danger of wobbling between practical training and emulation

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[1] Plus 35 if post-graduate degrees and diplomas are added.

of the science stream in 'grammar schools'. Teachers are also very hard to find, and adequate equipment very expensive. Post-secondary training in the Polytechnic or in good apprenticeship schemes is likely to produce greater satisfaction both to the pupil and to the employer.

2. *Trade schools.* The Balestier Road centre (Singapore Vocational Training Centre) is the most important, and has recently been strengthened. It has taken over the craft courses from the Polytechnic. Its full capacity is about 800 students, but in 1963 it was running at only half that number. Standards of instruction have been far too academic, and it is a real problem to secure local instructors who are prepared to give practical instruction with their sleeves rolled up. The school should, however, produce a good flow of craftsmen in due course.

There are some other government artisan training centres, of less repute, and also the mission school for orphan boys at Bukit Timah, which has turned out many boys highly praised by employers.

3. *Technician level;* 4. *Professional level.* The Singapore Polytechnic is producing both groups. Figures for enrolments and final examinations for 1963 are shown in Table 25.

TABLE 25. Technician and professional level: total enrolments and candidates for final examinations, 1963

Subject	Professional		Technician		Craft		Total enrolment
	Total enrolments	Candidates	Total enrolments	Candidates	Total enrolments	Candidates	
Engineering	240 + 14[1]	27	760	81	685	84	1 669
Architecture/ Building	166	9	295	14	144	49	605
Accountancy	373	32	—	—	—	—	373
Nautical[2]	—		—		—		35
TOTAL	793	68	1 055	95	829	133	2 712[3]

[1] 'Advanced chemistry'.

[2] Pre-sea training, 14; marine radio operators, 21; 35 passes.

[3] Full-time, 1,145; day-release, 288; evenings, 1,279. The totals have risen from 1,853 in 1961, i.e., by nearly 1,000 in two years.

If the Singapore Government accepts the Bowden Report, the Polytechnic will become attached to the university, with three professional schools—Engineering, Architecture and Accountancy. It will continue to produce technicians, and the principal is aiming at a proportion of five technicians to one professional. It is vital that, in the enthusiasm for full professional work, the Polytechnic should not lose sight of this far higher need of technicians.

Formal training in Singapore stands in a somewhat peculiar relationship to the actual commercial and industrial economy. A very large number of small firms cannot afford the salary demanded by a technician with his full polytechnic qualification. Chinese firms in particular tend to use a family member who has learned his skill on the job, and at much lower pay. There was even, in 1963, a hint of unemployment among technicians, despite the low output. This situation will change, though perhaps slowly. The larger expatriate firms will employ men with formal training, setting a higher standard. Moreover, the 'old style' Chinese firm will give way slowly to a new type, managed by a second-generation director who has often had some formal training overseas and is more inclined to value it in his staff. Singapore competes on price in a highly competitive market; and it is important that technicians should not price themselves out of employment at this stage. The demand for them, and the pay they can command, will certainly grow.

After technical training comes more applied training in supervision and management. Here there are encouraging developments—an Institute of Management (Economic Development Board), a Light Industries Service Unit (also EDB) which is to take over a wing of the Polytechnic, and the Singapore Supervisory and Management Training Institute, more concerned with the foreman level, T.W.I., etc. This may also become associated closely with the Polytechnic, and could be of great value.

Within industry, apprenticeship is well developed among a few large employers (Port Authority, Shell, etc.). Some 240 apprentices are in the Port Authority workshops, and some of these spill over into other industries when trained. Development of apprenticeship on a wider scale is important. In the right circumstances it can be the most effective of all technical training methods, and is certainly, in a developed economy such as Singapore is becoming, more effective than trade school training with its unavoidable remoteness from practical industrial conditions.

A further source of technically trained manpower is that of students returning from overseas. The numbers here are large. There were about 1,300 Singapore students in Australia in 1960; an estimated 4,000-5,000 from Singapore and Malaya in the United Kingdom; 1,200-1,600 in New Zealand; over 500 in the United States, and no doubt further numbers in India and, in the case of Chinese, in Taiwan. The existence of these large numbers overseas is a measure of the increase in technical and professional education still required in Singapore and in Malaysia as a whole. It is doubtful if the Polytechnic will be able to meet the need at both professional and technician level for more than another five years, and some thought will have to be given to a new institution before 1970, taking into account the possible development of the Chinese Ngee An College, which is to have a technical bias, and the future of Nanyang University.

EDUCATIONAL AND MEDICAL SERVICES

It is not necessary to go into the detail of supply of teachers and doctors. As to teachers, the required supply is a direct function of the educational programme, and the present weaknesses are obviously in the supply of science graduates for secondary science streams and of technical staff for the polytechnic and trade schools. These shortages are easier to state than to cure.

On the medical side, Singapore had about 707 doctors in 1963 (government 269, private 438), and a proportion of doctors to population of 1 : 2,400—far higher than elsewhere in South-East Asia except in the Philippines. Output is about 100 per annum, of whom about 30 go to the Federation of Malaya. Output from the new medical school at Kuala Lumpur will eventually ease the strain on Singapore; but, as suggested in the final section on Malaysia as a whole, the establishment of another medical school on the mainland may well become necessary, particularly if room is to be found for increasing numbers of applicants from Sabah and Sarawak towards the end of the decade.

CONCLUSION

A very great deal hangs on the success of Singapore's industrialization programme. Omens, in terms of inquiries and actual investment in new factories in 1963/64, were good. But Malaya (as well as every other South-East Asian country except Burma) is competing with Singapore to attract investment, and has achieved a good deal of success in attracting mainly light industry to the industrial township of Petaling Jaya (Kuala Lumpur) and to some smaller estates, such as the growing centre at Ipoh. On the whole, it is probably in the interest of Malaysia that Singapore should prove itself capable of demonstrating to South-East Asia and to investors from further afield that its well-known commercial skills can be matched by a growing reputation for industrial skill and enterprise. To achieve this will involve an intensive concentration on raising the standards and the volume of technical education and, perhaps above all, the standards of native industrial supervision and management.

Sarawak

THE ECONOMY

The population of Sarawak was 744,529 in the June 1960 Census. It is estimated in June 1962 to be 776,990. The growth rate between 1947 and 1960 was 2.5 per cent per annum, but it may now be somewhat higher. Population will probably pass the 1 million mark in 1970. The people are almost exactly equally divided between indigenous and non-indigenous:

387,672 indigenous[1] = 49.9 per cent (largest group, Sea Dyaks 31.1 per cent);
389,318 non-indigenous = 50.1 per cent (244,435 Chinese = 31.5 per cent; 136,232 Malay = 17.5 per cent; 1,737 European = 0.2 per cent; 6,914 other = 0.9 per cent).

Gross domestic product (GDP) is estimated to have risen from M.$375 million in 1955 to M.$460 million in 1961, at a rate of 3.4 per cent cumulative. In 1962 GDP per head stood at £69, which is a high figure in South-East Asia. The balance of trade has been consistently favourable, save for a small deficit in 1961. Gross fixed capital formation is running at about 16 per cent of GDP.[2]

The most important exports from Sarawak are rubber (40.1 per cent of total value in 1962), timber (22.6 per cent) and pepper (13 per cent). There are wide variations in some crops and prices: for example, illipe nuts, a very uncertain crop, valued at over M.$16 million were exported in 1962, representing almost 9 per cent of total value of exports, against a nil figure in 1960 and 1961, and a record of M.$20 million in 1959. Re-exports of oil from Brunei are not included here.

The most important imports are: food and rice, M.$68.3 million = 33.1 per cent, manufactures, M.$47.4 million = 23.0 per cent, machinery and transport, M.$33.9 million = 16.0 per cent, and chemicals, M.$14.6 million = 7.0 per cent. Mining of bauxite is of some importance (export 1962 valued at M.$4 million), but otherwise industrial production is in small units, employing only 10,000 (3.4 per cent of the labour force, against 240,000, or 81.3 per cent engaged in agriculture and forestry). The timber industry, from forestry to saw-milling and veneering, is the biggest 'industrial' enterprise.

Qualitatively, Sarawak is not an easy economy to develop. Of its 48,000 square miles, three-quarters are covered by tropical forest, and of the remaining 12,000 about 9,200 are used for shifting cultivation; barely 2,800 are used for 'settled' agriculture. Soils are swampy near the coast, thin and highly acid in the foothills, and too steeply sloping in the mountains. Communications are extremely difficult, both in the mountains and across the meandering rivers on the coastal swamp. Minerals include some oil (more may be found off-shore), bauxite, some deep gold and, finally, a deposit of coking coal which a Japanese company is now about to develop. It is clear that forestry and agricultural cash crops, which now account for 45 per cent of GDP and 80 per cent of employment, must bear the weight of development. The import of 68 million dollars' worth of food and rice stands out as an anomaly. It is due mainly to the laborious and totally uneconomic growing of hill-paddy by shifting cultivation in the interior, which does not in fact adequately feed the cultivators, let alone supply the towns; and to the difficulty of growing paddy on the ill-drained peaty soils of the coastal strip. Cash crop agriculture on the lower ground is almost wholly in the hands of smallholders; for example, the valuable pepper crop is mainly in holdings of three-quarters of an acre; only five sizeable 'plantations' are found in the country.

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[1] 'Indigenous' is normally used in Sarawak to include Land and Sea Dyaks, Melanaus, etc. It does not include either Chinese or Malays—the latter having come mainly from Sumatra—although both have been long established in Borneo.

[2] Unless otherwise stated, figures are from the 1962 Sarawak Report, 1964-68 Development Plan, 1964 Draft Estimates, Government Staff List and annual reports of departments.

In these circumstances, the chief objects of development policy are:

1. To increase production of cash crops: (a) by developing rubber, palm-oil and coconut plantings on the coast; (b) by encouraging hill farmers to plant rubber on the steep slopes; (c) by development of the timber industry.
2. To increase food production: by reducing as fast as possible hill-paddy shifting cultivation and encouraging rice production in swamps; vegetable production; animal husbandry (pigs and poultry), and fruit growing.
3. To develop the road transport system.
4. To develop education and health.

Capital allocations for government expenditure for the 1964-68 plan period reflect these priorities: agriculture, 31.7 per cent (of which half to rubber planting alone); transport, 32.2 per cent; social services, 14.5 per cent (education, 8.2 per cent; health, 6.3 per cent); total 78.4 per cent. The allocation in the industrial sector is only 0.2 per cent, but some industrial development should come from investment of private capital.

Manpower policy must reflect these objectives. Above all, generous provision is needed for the huge programme of agricultural innovation and resettlement, in difficult country, upon which the whole future of Sarawak depends.

THE EDUCATIONAL SYSTEM

Primary (standards I to VI)[1]

Total enrolled, 1962: 99,691 (standard I, 19,823; standard VI, 11,135).

Enrolments by race: Chinese, 52,637; Malay, 15,330; Indigenous, 31,072; other (Asian, European, etc.), 652; total 99,691.

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[1] *Annual Summary*, Sarawak Education Department.

Secondary

Total enrolled, 1962: 14,779 (form 1 and JM 1, 4,776; transition,[1] 1,806; form 4 and SM 1, 959; form 6 and SM 3, 528).

Enrolments by race: Chinese, 11,877; Malay, 1,328; Indigenous, 1,381; other, 193; total 14,779.

As far as possible, 30 per cent of all children completing primary VI are enrolled in secondary education. At form 3 the Sarawak Junior Certificate (corresponding Chinese examination at JM 3 in Chinese-medium schools) is taken. Total enrolment drops from 2,737 in form 3/JM 3 to 959 in form 4/SM 1. Cambridge Overseas School Certificate is taken at form 5 (the eleventh year of education) and Higher School Certificate at form 6(2) (thirteenth year of education).

Passes in the 1962 examinations were as follows: Sarawak Junior Certificate, 1,022; Chinese Junior Middle, 383; Cambridge Overseas School Certificate, 277; Chinese Senior Middle, 194; Cambridge Higher School Certificate, 43.

The 1960 Census gives some most valuable figures on the total numbers who had completed various grades of education by 1960, the total literacy rate, as for Sabah, being 25 per cent (see Table 26).

TABLE 26. Educational attainments of all communities, population 10 years old and over (1960)

Community	School level completed				
	Full primary	Secondary 3	Full secondary	Training college	University
European	35	183	417	58	279
Malay	3 141	775	104	64	7
Indigenous	2 970	637	71	82	2
Chinese	18 406	9 325	2 107	184	205
Other	163	153	130	6	55
All	24 715	11 073	2 829	394	548

If Europeans and 'others' are omitted, the dominance of the Chinese stands out. At secondary 3 there were in 1960 six Chinese to every one Indigenous or Malay person, and at full secondary more than ten to one in Chinese favour. The combined stock, all communities, of those with secondary 3 and above amounts to 14,844. The population over 18 years old in 1960 with the same qualifications would have been considerably lower, since school enrolments have been growing.

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[1] See below.

As from 1962 the Government invited Chinese secondary schools to convert to the English medium as a condition of receiving grant aid. Transition classes were established between primary and secondary to enable Chinese pupils to enter form 1. By 1963, 12 out of 16 Chinese secondary schools had agreed to do this. As these pupils work their way through to the upper forms, the numbers of School Certificate and Higher School Certificate passes will increase sharply. The 1962 figures show 1,806 pupils in 'transition' classes,[1] and these figures are likely to rise. The total enrolled in English-medium form 1 in September 1962 was approximately 2,800,[2] and in 1963 these figures would be swollen by the 1,806 'transition' classes. A figure of 5,000 in form 1 is likely in 1964, which might give 1,800 School Certificate entrants by 1969 and possibly 350-odd Higher School Certificate passes in 1971.

THE EXISTING MANPOWER SITUATION

The 1962 distribution of the labour force is as follows: agriculture, forestry, etc., 240,000 (81.3 per cent); mining, 2,400 (0.2); manufacturing, 10,000 (3.4); building, 4,600 (1.5); electricity and water, 530 (0.9); transport, 5,000 (1.8); services and other, 31,700 (10.9); total 294,230.

A very rough analysis of the 1960 Census gives the following distribution of manpower by categories:

Category	*Total*	*European*	*Malay*	*Chinese*	*Indigenous, etc.*
I	1 600	410	450	490	250
II	7 400	300	1 200	4 500	1 400
III	40 500[3]				
IV	245 000[4]				
	294 500				

The main manpower needs at present are not in either the commercial or industrial field. Industry is small; commerce is well looked after by the Chinese. The urgent needs are in providing professional and administrative cadres for five main fields: (a) central and local administration, to replace European officers; (b) education, to provide locally trained teachers; (c) health, to train particularly doctors and higher-grade staff; (d) agriculture, to strengthen both research and field services; (e) public works and transport, to train higher and professional grades. Some account of each of these sections will be given below. But psychological/political factors cannot be neglected in manpower policy in Sarawak and Sabah. It has been settled policy that the indigenous peoples should in due course come to fill a fair proportion of the senior posts in Sarawak. The educational dominance of the Chinese means, however, that the great majority of those attaining higher educational qualifications, from School Certificate up to university degrees obtained overseas, will be Chinese. This situation will continue for the next ten years. The adoption of English and taking of English examinations in secondary schools will in fact re-emphasize this dominance in a few years' time; for, up to now, many Chinese with no English qualification have been, in a sense, disqualified for posts in the public sector. To fill four-fifths of senior public positions with Chinese over the next few years could easily lead to serious objection.

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[1] Included in the total secondary enrolment above.

[2] *Annual Summary*, Table III B (ii).

[3] Craftsmen, junior clerks, retail, some services.

[4] Agricultural labourers.

Chinese represent at present nearly one-third of the total population, and indigenous peoples one-half. In the top layer of the economy (Categories I and II), the proportions are: Chinese 5,000; Malay, 1,650; Indigenous, 1,650; Europeans 700. What proportions would be politically acceptable ten years from now it is not for this report to say; but it might be likely that a minimum proportion which the indigenous peoples would aim for would be one-third from each of the three main groups in the economy as a whole, with a somewhat higher proportion of indigenous people in the administration. It is in any case probable that the Chinese would dominate in commerce, so that it is in the training of indigenous people in administration, education and in the technical services and skills of agriculture that effort is most likely and necessary.

While the retention of some Europeans in senior administrative positions may be temporarily necessary, giving more time to indigenous peoples to qualify for these posts, it is necessary to stress the political difficulties which have arisen in every newly independent country if this situation continues too long after independence. It may be that the European element should move into advisory, expert and training capacities, particularly in respect of the most senior policy-forming positions in the Central Administration. European secondary teachers, agricultural specialists and technical experts will long be necessary and acceptable, and this also probably applies to Chinese. It follows that the greatest emphasis must lie in training indigenous peoples for administration.

MANPOWER REQUIREMENTS

General

The requirements of high-level manpower for the Sarawak economy should not be exaggerated. The Central Administration is bound to grow, but should not become overweighted. The Government Staff List of 1962 shows about 420 in Superscale, A and B Scales, and 270 in Scale C4-6, which represents assistant secretaries and other junior administrators above the clerical rankings. These figures include all the professional officers (engineers, doctors, agricultural officers, etc.) but not the schoolteachers.

Outside government posts and the teaching profession, demands at the college graduate level are likely to grow extremely slowly—a few engineers for small industry, a few fully trained accountants, a few lawyers, officers for the armed forces (not college graduates), a very few agriculturalists for private estates, some senior managers for larger companies which may come to the country over the next ten years, a few doctors in private practice. However, the demand for staff with secondary education plus some training should grow considerably faster, both inside and outside government. And indeed in a country such as Sarawak, with no university—and Malaya will not be able to spare many university graduates—the aim should be to build up a strong post-secondary layer of trained men and women and to avoid the overweighting of college graduates to technicians which has been typical of many developing countries.

The rough analysis of the 1960 Census (above) is, of course, an analysis of the number of jobs for which secondary or higher education is either essential (doctor, engineer) or desirable (manager, senior clerk). It is not an analysis of educational attainments of men holding those jobs in 1960—clearly, there were fewer than 9,000 School Certicate holders and above at that time; in fact, as the census figures showed, there must have been well under 15,000 adults[1] (perhaps 10,000?) who had completed secondary 3 and above. The justification for expansion of the educated manpower in terms of employment is twofold: first, that more jobs will and should be created, and second, that the qualifications of job holders should be improved.

Categories I and II were analysed to include all professional and technical and sub-professional grades (excluding teachers without secondary education), all administrators and executives, all managers and directors, stenographers, 25 per cent of business proprietors, 40 per cent of clerks, all ships' officers, insurance workers, estate owners, transport controllers—making 9,000 jobs in all.[2]

[1] 14,844 total over age 10 with these qualifications.

[2] Category III: craftsmen, machinists, drivers, telephonists, 75 per cent of retail shop-owners, sales assistants, 60 per cent of clerks, teachers without secondary education, some services (e.g., hairdressers), etc. Category IV: agricultural, labourers, etc.

It is clear that, over ten years, this stock of holders of high-level jobs must be increased, and qualifications at the lower end improved. To double the number implies:

Category	*Stock 1960*	*Wastage*[1]	*Addition required*	*Output required*
I and II	9 000	2 750	9 000	11 750 = 1 200 p.a. average

The composition of the 18,000 target in 1970 would necessarily show a much lower proportion of Category I, possibly comparing as follows:

	Category I		*Category II*	
1960	1 600	+	7 400	= 9 000
1970	2 500	+	15 500	= 18 000

Looking at School Certificate outputs 1960-70 (1969 passes must be in form 1 by 1965), the most that could be hoped for is about 1,200-1,300 passes in 1970; and this might produce a total of 6,500 passes in the ten years 1961-70. This implies that a considerable proportion of the Category II jobs would be held either by those who passed only the Sarawak Junior Certificate or by personnel borrowed from Malaya, Singapore or non-Malaysian countries.[2]

It is equally clear that only a moderate proportion of Category I jobs can be held by university graduates originating from Sarawak. By the end of 1962, 96 Sarawak students were studying abroad under government scholarships and bursaries on degree courses; another 45 were on diploma courses; 31 on certificate courses and 74 on practical training attachments (total 246). Assuming: (a) that all these return, and that 180 are capable of Category I employment; (b) that about 540 pass Higher Certificate in the six years 1961-66, and 500 return as graduates by 1970, the total recruitment to Category I might be 680, to which might be added 400 returning from abroad from privately arranged courses, of which 100 might go to Category I (total 780). The composition of Category I and II in 1970 would then be as shown in Table 27.

It is reasonably easy to see that Category II could be filled, although with some under-qualified staff; the importance of training for Junior Certificate holders (and those who fail School Certificate in form 5) is emphasized; they would have to fill a third of Category II jobs. However, the apparent deficiency in Category I cannot be overlooked. Before discussing it further, some analysis of the actual posts which will be needed in the public sector is necessary.

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1. A low rate, because a high proportion of holders are young.
2. About one-quarter, or rather less, of School Certificate passes would go on to sixth form and university.

TABLE 27. 1970 targets for Categories I and II

Category I		Category II	
Stock 1960, less 30 per cent wastage	1 120	Stock 1960, less 30 per cent wastage	5 180
Returned from overseas	780	Addition, School Certificate holders[1]	5 000
	1 900	Addition, Junior Certificate or failed School Certificate	5 000
Deficiency	600	Returned from overseas (remainder)	370
		Deficiency	—
Target	2 500	Target	15 550

1. 6,500 less 1,500 to sixth form over the whole period.

Agriculture, forestry, lands and survey

The staff of the Agricultural Department in 1963/64, including 'development' staff, veterinary, fisheries and research, was approximately as follows:[1] Superscale and Division I (graduate), agricultural officers, etc., 35; Division II (diploma level), agricultural assistant officers, assistant veterinary officers, etc., 45; Division III (post-School Certificate), agricultural assistant, etc., 150; Division IV, junior agricultural assistant, 365. In proportion to population, the graduate level is high; but the proportion of diploma and agricultural assistant officers is low to the graduate staff. A proportion of 3, or even 4, diploma-level staff to graduates could well be developed, giving a staff for 1970 in the order of 50 graduates, 150-170 diploma level, 350 agricultural assistants, with junior agricultural assistants as required.

Staff in forestry amount to 12 graduate officers, 13 rising to 17 in a technical (post-School Certificate) grade, and 160 forest guards. The middle grade is hard to recruit, and is clearly inadequate. A 1970 target, including research and teaching as well as field officers, might be 20 graduate, 40 technical, 200 forest guards.

The 1970 staff for these two departments would thus add up to 70 graduate officers, 150 diploma staff, 350 agricultural assistants, and 40 technical forestry, totalling 540 post-School Certificate. These figures have deliberately been put on the high side, in view of the immense task facing the departments in Sarawak and the proportion of development expenditure allocated to it.

On the training side, below graduate level, there is no diploma-level training in Sarawak or Sabah; agricultural assistants can be trained in Sabah, and there is a scheme for sending rubber assistants to rubber estates in Sabah and in Malaya. There is a Sarawak school for training junior agricultural assistants, and a recently started special school for training extension teams (both men and women) at agricultural assistant level at Tarat.

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[1] Figures from Government Staff List and 1964 estimates.

The Lands and Surveys Department also has a heavy task, particularly in allocating and giving title to alienable land, and in a host of technical and legal services. The establishment for 1964 shows 36 Superscale and Division I posts (graduate), 49 Division II (diploma-level, e.g. assistant registrar, cartographer), 325 Division III (technical assistants), and 769 Division IV (demarcators, tracers, etc.). The staff has recently been quite steeply increased. But the Development Plan will put heavy demands on it, and some increase over ten years is necessary. A guess might be 40 Division I, 75 Division II, and 400 Division III.

A survey training school (two-year course) has been set up with New Zealand Colombo Plan aid and is established at Semonggok, near Kuching. The first course started in 1963 for officers from Sabah and Sarawak.

Total estimate for 1970, agriculture, forestry, lands and surveys: Category I (graduates), 110; Category II (diploma, 265; assistant, 775), 1,040 School Certificates; Category III (junior assistants, forest guards, etc.), 1,500.

Health services

There are at present, in all, 58 doctors[1] in Sarawak, including mission doctors —a proportion of 1 : 13,400 of population. The senior staff of the Medical Department is given as 47, including matrons, sister tutors, health sisters, nursing sisters, hospital superintendents. Figures for nurses and hospital assistants are 253 and 150. There are 448 midwives.

While the senior staff are mainly trained overseas, there is a remarkably good system of local training. The 1962 report of the Director of Medical Services lists 44 Sarawak students overseas on graduate or 'diploma-level' courses (of whom 20 in medicine, 3 in dentistry, 1 in pharmacy), and the following staff in training in Sarawak: 46 student nurses, 51 midwives, 11 hospital assistants, 14 student laboratory technicians, 3 dispensers and 1 X-ray technician, 13 assistant health visitors, and 261 'home helps' (under supervision). It is reasonable to assume that about 50 School Certificate leavers should be recruited for training each year, with a considerably larger number of Junior Certificate level in the early years, tailing off as it becomes possible to recruit from form 5 for all major services. At the professional level it would seem that the doctors are too few for the considerable range of medical services now existing or being created. A public service of at least 100 doctors, supplemented by 40 to 50 in private practice and improving the proportion of doctors to population to 1 : 7,000 of thereabouts by 1970 would be a reasonable aim. The strength of the service would then become roughly: 100 graduate, 200 'diploma', 400 post-School Certificate, and 800-plus junior.

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[1] 30 government, 18 private, 3 mission, 6 Shell Company, and 1 Peace Corps.

The Health Service in Sarawak is remarkably well-found. There are about 1,900 beds (1,780 government, 115 private) for 776,000 population, with a further 219 'rest-beds' in 30 rural dispensaries. Another 200 beds are now becoming available in the new Kuching Hospital, and a programme of building small district hospitals is proceeding. In addition to the dispensaries (there are an additional 10 mobile ones) is a system of training 'home helps' (about 260) who are given a bare minimum of essential common drugs and who help with child care, hygiene and the commonest ailments in the 'long-houses', on a voluntary basis. A new Rural Health Improvement Pilot Scheme has been started, involving the simple training of hand-picked men from rural areas in the interior, where agricultural extension teams are working; these, after training, will assist in simple rural hygiene and will be called 'health overseers'. Thus Sarawak is not relying wholly on a small force of highly trained professionals but carrying the health campaign right down to the simplest level, using the good will and ability of men and women with little formal education. Provided that supervision can be maintained—and this justifies the staff increases suggested—this system is, in addition to its health effects, a vital form of adult education which should have great benefits.

Engineers and technicians

The largest single need for engineers and technicians lies in the expenditure on road transport and in the construction programmes. The need is therefore for civil engineers, surveyors, quantity surveyors, works foremen, technical staff in drawing offices, cost accountants. There is a subsidiary need for irrigation, drainage and water engineers for both the agricultural and road programmes. The requirements for electrical and mechanical engineers are considerably smaller.

The total staff on the first three levels, including development staff, land transport and drainage irrigation, and for Posts and Telegraphs (1964 estimates) is approximately:

	I. Graduate, full professional	*II. Assistant engineers, works superintendents, surveyors, senior technical assistants*	*III. Technical and junior technical, foremen, clerks, etc.*
Works, etc.	65	130	288
Posts and Telegraphs	12	17	?
	77	147	350 plus

Arrangements for overseas training had been made to replace the 40 full professional staff in the Public Works Department (but not the extra development staff) by 1970. The arrangements for 'diploma' level training are, however, unsatisfactory. Entrants, if possible with School Certificate, do a one-year course at the Road Survey School, supported by a one-year (Colombo Plan) correspondence course. They are then posted to various divisions and, if possible, continue correspondence courses. Some entrants are only at Junior Certificate standard and wastage is high. At artisan level there is no formal apprenticeship scheme, and probably a high proportion of Public Works Department artisans would not pass the appropriate trade test.

The Trade School in Kuching, recently started in a converted cinema but moving to new buildings, was covering carpentry, joinery and metal-work to City and Guilds standard; it should add an electrical installation section and automobile maintenance section in 1964/65. A first batch of 64 boys, mainly carpenters, complete the course in May 1964, and a group of about 15 metalworkers will complete in 1965. Entry is at Junior Certificate. The Trade School also gives valuable part-time courses to technicians from Posts and Telegraphs, Electricity Supply Company, Lands and Surveys, Public Works Department, and Borneo Company employees.

There is no other trade school in Sarawak, but some woodwork instructors are trained in the Teacher-Training College and there is a Nautical School at Sibu with two instructors. There is also a small commercial institute for stenographers (15 p.a.) and typists (40 p.a.).

It is clear that training systems, both at artisan and technician/diploma level, are at present inadequate, and there is an acute shortage of instructors. A technical college or polytechnic is certainly needed by Sabah and Sarawak jointly (see below), and the part-time work in technical education could be expanded.

Total establishment target for 1970 might be Category I, full professional: 130; Category II, technical (diploma level), 240; Category III, junior technicians, office, technical staff: 650.

General administration

The foregoing sections have dealt almost exclusively with professional and technical staff in agriculture, forestry, lands and survey, medical, engineering, roads, construction and in the public sector only. They omit general and district administration and a large number of departments—Audit, Broadcasting and Information, Police, Co-operatives, Inland Revenue, Judiciary, Labour, Marine, Printing, Customs, Prisons, Treasury and some small technical departments (Geological, Aviation and Meteorology). They also omit teachers (see below). The extra total for these omitted departments in 1963 (excluding teachers) amounted to about 130 officers in Category I and 160 in Category II. There is no reason why these numbers should rise very greatly, and an allowance of 200 Category I and 270 Category II (the relation at present is badly balanced) should be enough.

Teachers

The force of teachers in September 1962 totalled 3,825 (2,708 men and 1,117 women), divided as shown in Table 28.

TABLE 28. Distribution of teachers

Educational level	Primary		Secondary	
	Trained	Untrained	Trained	Untrained
Graduates	1	10	27	159
Passed secondary	550	1 172	154	181
Below secondary	610	953	4	4
	1 161	2 135	185	344
TOTAL	3 296		529	

Teachers passing their final examination from teacher-training colleges in 1962 were: 116 below secondary (grade IIIA) and 58 secondary (Grade IIA). Enrolment by race was: Chinese 208, Malay 52, Indigenous 116, and other, 1 (total 377). Clearly, teachers in forms 4, 5, 6(1) and 6(2) should ideally be mostly graduates, and teachers in forms 1-3, all grade IIA, trained. Apart from the task of training teachers now in the schools, by refresher courses and other means, there is the problem of expansion. The 1964-68 Development Plan envisages that by 1968 there should be a place in primary I for every child likely to be able to enter school; this would involve providing 27,000 more places, giving an enrolment of 129,000 in all primary education by 1969. This would involve 900 additional teachers at 1 : 30 teacher/pupil ratio. The two existing training colleges (Batu Lintang and Sibu) can produce about 700 primary teachers by the end of 1968, and a new college to be built, another 300, making 1,000.

For secondary education, the aim is to maintain an entry of 30 per cent of primary leavers. This will involve provision of about 45 additional form I by 1968, mainly in government schools, of which an additional 20 are planned. About 400 additional secondary schoolteachers will be needed, of which Batu Lintang College might produce 230. The gap may be filled partly by students returning from overseas and partly by expatriates.

It is not clear if the figures for additional teachers required allow for replacement of wastage in the existing force. If, as appears likely, they do not, the requirements are that much higher:

	Stock 1962	*Six-year wastage (18 %)*	*Force required 1968/69*	*Total output required*
Primary	3 296	600	4 200	1 500
Secondary	525	100	925	500

By 1970 it certainly seems necessary to aim at a teaching force of 4,500 in primary schools and of 1,100 in secondary schools; of the former, at least 2,000 should have had secondary education up to School Certificate; of the secondary teachers it might be reasonable to hope for two-fifths to be graduates, i.e., 450.

CONCLUSION

It is now possible to compare the target of requirements up to 1970 in the public sector with the target of doubling Category I and Category II as set out above. The figures suggested were 2,500 Category I and 15,550 Category II (see Table 27). Against these figures, the public sector requirements are suggested in Table 29.

TABLE 29. Public sector requirements

Branch	Category I Graduate	Diploma-level	S.C. or J.S.C. plus
Agriculture, lands, forestry	110	265	775
Medical services	100	200	(?800)
Engineering, technical	130	240	650
General administration	200	270	(?800)
Teachers	450	650[1]	2 000[2] 2 500[3]
TOTAL	990	1 625	7 525

1. Junior secondary.
2. Senior primary.
3. Junior primary.

Against the target stock of 2,500 in Category I and 15,550 in Category II it would appear that the more detailed estimates reduce the need for as many as 2,500 in Category I—the private sector would scarcely need an additional 1,500 and above the 990 in the public sector, even though the private sector Category I did not contain more than 30 per cent of graduates. On the other hand, if the public sector is to reach 9,000 in Category II, an allowance of another 6,000 for the private sector is barely sufficient. Broadly, it would seem that the total target of 18,000 is reasonable and feasible, but the distribution is more likely to be 2,000 Category I to 16,000 in Category II, with a high proportion (two-thirds or more) of all graduates in the public sector. It will be noted that the lower ranks of Category II will contain at least 5,000 Junior Certificate holders doing jobs which will later demand School Certificate qualifications. Nearly 3,000 of these will be primary teachers, previously excluded from this category. They should, however, be both trained and holders of the Junior Certificate, and as such they can reasonably be included. The final objective must certainly be that all teachers should have reached form 5 before they enter training.

The major issues of policy remain.

First, Sarawak and Sabah will assuredly one day need a college of university standing. But the output from Higher School Certificate (which is matriculation level in the University of Malaya and Singapore) in the two countries combined does not as yet justify the foundation of a full university college. On the other hand, there are four fields in which Sabah and Sarawak do now need new and higher institutions, and these could properly become the foundation for future university work:

1. There is need and justification for an agricultural college going to diploma level. It should now be unnecessary to send School Certificate holders overseas for this purpose.
2. Forestry is of immense economic importance to both Sabah and Sarawak, and a school of forestry is surely justifiable. The present school in Sabah (Sandakan) is at a junior level.
3. A technical college reaching diploma level for engineers and certain other skills will be required as soon as it could be provided.
4. A school of education to provide teachers for the higher forms of secondary schools (since full graduates will not be available in sufficient numbers) would seem clearly justifiable.

It is beyond the terms of reference of this report to suggest what relationship these new institutions might have to the universities on the mainland, or where they should be placed. It may well be desirable that they should become institutes giving a diploma which is recognized or indeed given by a parent university. After a few years they would easily move on to become faculties of a university college of Eastern Malaysia. It has also been suggested that a 'junior college' of arts and science might well find a place on the island, to grow up, in its turn, and join the institutes in forming such a college. While there is ample precedent for linking special institutes to a university—for example, in East Africa—the 'junior college' proposal requires careful thought. It would have to give at least as good a qualification as the present sixth forms for purposes of university entry; and it might be unfortunate (and expensive) to destroy present sixth-form work in order to feed a new institution simply for the prestige of the name 'college'.

Second, some more definite and urgent action seems to be needed to train indigenous candidates for senior government posts. The great majority of returning students will be Chinese and many will have professional qualifications. It is in general administrative posts that there will be room to employ indigenous staff, and, if the jobs are to be filled quickly there may not be time to wait until they complete a university course. There may well be a case for selection of a certain number of indigenous candidates with good School Certificate passes (and some who fail in Higher School Certificate) to undertake a special training course for posts in the administration. Such a course could be two years' study in a local administrative staff training college, consisting of work not unlike sixth-form work but with a greater concentration on the economic and social background of Malaysia, followed by eighteen months' practical training, of which some part should consist of an attachment overseas, possibly in Kuala Lumpur. This would bring candidates into post 3.5 years after School Certificate, instead of the 5 or 6 years needed for Higher School Certificate and a full degree course. Moreover, it would provide a training far more closely related to their career. The attraction of possible early promotion in government service should be enough to balance the pull of a university degree, at least for the less academic types. A diploma in administration could be given, if necessary—but this is not an academic but a highly practical training.

Sarawak has to face urgent manpower needs with a strong political pressure for indigenous participation. It is possible to achieve a solution, without downgrading the quality of the university degree and of full professional qualifications, partly by diploma training in technical fields and partly by a bold use of practical administrative training which need not be so closely tied to academic standards as it was under the colonial administration.

Sabah

THE ECONOMY

The population of Sabah, by the 1960 Census, was 454,421, made up as follows: 306,498 Indigenous (67.5 per cent; largest group, Dusuns, 32 per cent), 104,542 Chinese (23.0 per cent), 1,896 European (0.4 per cent), and 41,485 others (9.1 per cent). 'Others' include Indonesians, Filipinos, Indians, Ceylonese and groups from Sarawak, Singapore, Malaysia, Cocos Islands.

Population growth, 1951-61, was estimated at 2.9 per cent and will almost certainly exceed 3 per cent in the 1960's. Population by 1970 will therefore be somewhat above 600,000. There is a noticeable difference in proportions compared with Sarawak, since the indigenous peoples make up 67.5 per cent of total population, and the Chinese community less than a quarter.

Gross national product was estimated at M.$300 million in 1961, giving an income per head of M.$660 (£75.5).

The main Sabah exports and imports in 1962 are shown in Table 30.

TABLE 30. Main exports and imports, 1962 (M.$ million)

Exports[1]		Imports	
Timber	122.1	Machinery	40.4
Rubber	36.7	Tobacco, etc.	39.2
Coprax	18.5	Provisions	27.4
Tobacco, hemp, fish, etc.	7.7	Oils	18.4
Other	49.7	Metals	13.4
		Rice	11.8
		Textiles	10.6
		Vehicles	10.2
		Other	77.5
TOTAL	234.7		238.9

[1] Including re-exports.

Although the balance of trade was adverse, it had been consistently favourable since 1958, and exports reached a record figure in 1962—Sabah has been having a mild boom. It is worth noting that, of all exports, two-thirds are covered by timber and rubber, and that provisions and rice accounted for one-sixth of all imports.

In productive capacity Sabah has one advantage over Sarawak: its soils are more fertile, and in certain areas of volcanic soil, near Tawau, they are of the highest fertility. But it shares several similar difficulties. Road communications, particularly from east to west coast, are barely developed and construction difficult and costly. Secondly, there is the same difficulty of shifting cultivation in the mountains. Sabah is well placed on the shipping route Singapore-Philippines, with high and rising activity in its ports at Jesselton, Labuan and Sandakan, and has an international airport at Labuan, as well as the Jesselton airport which is not yet able to take jet aircraft.

The main aims of development are clear-cut:

1. To resettle a large number of shifting cultivators on to more fertile land on the east coast, growing rubber, cocoa and palm oil, as well as a better food crop, and to develop the Labuk Valley.
2. To develop the forestry and timber industry.
3. To develop road and air communications.
4. To develop education at all levels.

There is an air of energy and optimism about the agricultural development planning which is extremely encouraging, and the progress of education, from an almost zero point in 1946, is a remarkable achievement. With an income per head high by South-East Asian standards (higher, for example, than in the Philippines), Sabah has considerable possibilities of growth.

Nevertheless, the educational level of two-thirds of Sabah's population is still desperately backward, partly owing to the large numbers living widely dispersed (shifting cultivation may need 70 acres per family) in mountainous country, inaccessible by road and slow to reach by water. Development cannot go far until education is more widely spread, nor can the indigenous peoples play their part in government.

Nothing better illustrates this problem of lack of education in a society of primitive cultivators than Sabah's acute shortage of labour: 16,000 Indonesians have been imported for rubber tapping, etc., on the east coast and building construction is severely hampered. This shortage will disappear (and almost certainly turn to an unemployment problem, as it has in every developing country) as the young, better-educated members of the indigenous peasant community begin to seek more varied opportunities in new kinds of employment and in the towns.

THE EDUCATIONAL SYSTEM

Primary. Total enrolled, I-VI, 1962: 58,046 (= 12,750 per 100,000, or 70 per cent of age group).

Secondary. Total enrolled, 1962: 5,515 (= 1,250 per 100,000, or 13 per cent of age group).

Enrolments by standard. Primary I, 17,108; primary VI, 4,180; form 1, 2,056; form 4, 492; form 6, 126.

Racial distribution of pupils. Chinese, 33,621; European and others, 4,288; Indigenous, 25,657; total 63,561.

Examination passes

	Passes	Entries
Primary VI:		
Malay medium	526	1 238
English medium	825	1 893
Chinese medium	579	1 453
Junior Certificate:		
English	567	771
Chinese	200	310
Cambridge Overseas School Certificate:		
English	193+38 GCE	261
GCE only (Chinese)	32	71
Cambridge Higher School Certificate	35	39

Only 18 of the 261 entries for School Certificate were indigenous people.

Seventy Sabah students held Government scholarships and were studying overseas in 1962.

Analysis of educational attainment from the 1960 Census shows some extremely interesting figures. Over-all literacy stood at about 25 per cent of total population over 10 years, as in Sarawak.

Total population over 20 years of age in 1960 who had completed various stages of education were: full primary, 13,691; secondary 3, 3,849; secondary 5, 2,188; teacher-training college, 303; university, 304.

The following is a similar breakdown by races for all population over 10 years of age in 1960:

Stage completed	Europeans	Chinese	Indigenous	Other
Primary	57	9 004	3 264	2 017
Form 3	222	3 353	262	1 007
Full secondary	521	1 178	92	527
Training college	57	101	113	46
University	125	115	2	62
All levels	1 275	43 377	23 117	10 748

Enrolments by race in secondary education in 1960 were: 477 Indigenous, 3,374 Chinese, 4 European, and 182 others; total 4,037. By 1962, however, enrolled indigenous pupils in secondary schools had risen to 1,050 out of 5,515, i.e., to one-fifth: this ratio will, of course, improve as the weight of indigenous population is increasingly felt. It is unnecessary to stress the huge educational start which the Chinese have acquired over all other communities (the examination results, of course, include Chinese in the English as well as in the Chinese streams of secondary education). It is interesting to note the total 'stock' in 1960 of adults with secondary and higher education (6,644) and of adults with primary VI and above (20,335).

The proportion of indigenous pupils in secondary education will, of course, rise. In 1963 there were over 500 in pre-secondary 'bridge classes', 367 in form 1, 120 in form 3, 30 in form 5 and 7 in form 6.

Entry from primary to secondary was in the past as high as 50 per cent and about 40 per cent of those who entered form 1 went on past form 3 to enter form 4. Government policy is now to reduce entry from primary to 25 or 30 per cent but to cut down the losses at form 3. It is impossible to say how many of the 2,000-odd children enrolled in form 1 in 1962 will pass the Cambridge Overseas School Certificate in 1966, but it might amount to 550-600, rising to possibly 1,000 by 1970.

THE PRESENT MANPOWER SITUATION

The 1960 distribution of the labour force,[1] by occupation, was: agriculture, forestry, fishing, 136,567 (77.3 per cent); craftsmen, production, labourers, 17,198 (9.7); sales workers, 5,915 (3.4); service workers, 5,616 (3.2); Transport/communications, 3,936 (2.2); clerical, 3,522 (2.0); professional, technical, etc., workers, 3,176 (1.8); administrative executive, 696 (0.4); total 176,626 (males only: 123,317).

The Industrial Classification was: agriculture, forestry, fishing, 142,113 (80.5 per cent); services, 10,077 (5.7); commerce, 7,734 (4.4); manufacturing, 6,937 (3.8); transport/communications, 4,657 (2.6); building, construction, 4,488 (2.5); other, 820 (0.5); total 176,626.

A very rough analysis of the occupational (2 digit) tables results in the following distribution of manpower by categories and by race in Categories I and II: Category I: 749 (Indigenous 114, Chinese 258, others 377); Category II: 4,994 (Indigenous 861, Chinese 2,832, others 1,301); Category III: 22,618; Category IV: 146,588; teachers: 1,677 (Indigenous 511, Chinese 934, others 232); total 176,626.

Teachers by category in 1962 were: graduates 337; those with secondary education 857, and 1,189 who had not completed secondary, a total of 2,383. The 1960 teachers could be divided in Categories I, II and III in roughly these proportions, i.e., half to Category I plus II and half to Category III.

The total of Category I and II, with 800 teachers added, is 6,500 (rounded), i.e., 0.14 per cent of total population, fractionally above that of Sarawak (0.12 per cent).

The main requirements for high-level manpower in future are exactly similar to those for Sarawak, namely: (a) 'Borneonization' of the administration; (b) development of field and research staff for agriculture and forestry; (c) training of teachers; (d) training of surveyors and civil engineers and foremen for roads and construction; (e) medical staff.

There is an additional short-term (3 to 5 years) problem of an acute

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1. Census figures.

shortage of labour, which will probably be met by short-term borrowing. The possibility of borrowing an experienced large contractor who would both recruit and train labour in the use of mechanized equipment will no doubt be considered.

As in Sarawak, the political issue of the share of the indigenous peoples in senior government posts must arise. The same general principles would apply: to train indigenous candidates for administration, for which the longer technical degree is not necessary, and for the field staff in agriculture, medical and 'diploma-level' technical services; and to move (or replace) expatriates into advisory, specialist and training roles. The advantages of giving local people experience on the mainland, by a temporary exchange with civil servants from Kuala Lumpur, should not be neglected. This would give Sabah people a larger view of Malaysia and avoid the permanent filling of posts to which they would later return. It would also give Malay mainlanders a better understanding of Sabah's problems and, above all, attitudes and susceptibilities.

MANPOWER REQUIREMENTS

General

As for Sarawak, it is worth while to examine the possibility of doubling the Category I and Category II manpower in Sabah over the ten years 1960-70. The mathematical implications are as follows:

Category	*Stock 1960*	*Wastage (30 %)*	*Stock required 1970*	*Total extra required*
I and II	6 500	1 930	13 000	8 430

The proportion of college graduates to men and women trained post-School Certificate must be low, and some Category II posts would have to be filled by candidates with post-Junior Certificate education only. The possible total supply cannot be worked out accurately, but the following round figures may provide a useful target:

Total School Certificate passes, 1961-70		5 000
Add:	Students returning from overseas from earlier School Certificate passes	200
	Students returning from overseas (private arrangements)	400
		5 600
Subtract:	Students sent overseas not returning by 1970	500
		5 100
Deficiency (against 8,430 required)		3 330

All these figures are, of course, fairly hazardous estimates. Privately arranged overseas study, usually either from Chinese streams or occasionally from students who fail School Certificate, might play an even larger part.

This deficiency of about 3,300 would have to be made up by the training of those who failed School Certificate and by those with only Junior Certificate passes. No allowance has been made for promotions from Category III to Category II posts, since these men have to be replaced by candidates with gradually rising educational qualifications.

The great majority of students returning from overseas government-sponsored courses will be Chinese in the early years, as will almost all those with privately arranged training. Local post-School Certificate training for indigenous candidates thus becomes all the more important.

Agriculture

There are said to be about 50,000 farming families in Sarawak, of whom 20,000/25,000 might be on economic farming units. Most of the remainder are shifting cultivators, burning-off forest and growing hill paddy. It is proposed to resettle 10,000 of these families during the 1964-70 Plan, moving them to the east coast where they can grow wet paddy, vegetables and a tree crop (rubber, cocoa, oil-palms). (There is no dry season sufficiently long to grow sugar-cane.) This massive movement and re-education will require more agricultural staff, especially in Division II (diploma-level) and Division III (agricultural assistant). For 1964 the purely agricultural field staff were, roughly, 11 agricultural officers in Division I, 13 plus 2 supernumerary in Division II, 38 in Division III and about 89 in Division IV (junior agricultural assistants). By 1970 the graduate staff might rise to 20, the diploma staff to 35, Division II to at least 60. Both the research staff of 10 Division I, 5 Division II and 11 Division III, and the animal husbandry staff of 4 Division I, 10 Division II and 11 Division III would need more than doubling. In addition, about 6-8 rubber assistants (Division III) and 20-30 junior rubber assistants (Division IV) will be needed for the resettlement scheme. A considerable number of staff (draughtsmen, etc.) will be needed for the large Labuk Valley development project, which is at present staffed by a United Nations survey team.

Both the Lands and Survey and the Forestry Departments will also be put under strain by the development plans and will need more staff. Provisionally, about M.$120 million out of M.$250 million in the total Sabah Plan is devoted to agriculture.

Total staff (1964 estimates) for agriculture (all divisions, including animal husbandry, research and development), co-operatives, lands and survey, forestry, were as follows:

	Division I	*Division II*	*Division III*
Agriculture	29	36	85
Forestry	14	20	83
Lands and Survey	25	17	197[1]
Labuk Valley Development Research	7	47	105
	75	120	470
An estimate of needs by 1970 might be:	100	180	600

Medical services

The medical staff as at 31 December 1962[2] is shown in Table 31.

TABLE 31. Staff of medical services, 1962

Service, etc.	Division I	Division II	Division III
Headquarters staff	3	2	1
Medical officer and specialist	13	31 senior nursing	288 nurses (59 assistant nurses and hospital assistants)
Dental officer	2	5 technicians and nurses	—
Maternity and child welfare	—	5 health sisters	44 rural health nurses
Hygiene	1 chief inspector	2 senior health inspectors	27 health inspectors
Malaria eradication	1	1	83
Tuberculosis control	1	2 health visitors	31 technicians and assistant nurses
	19 (+2 dental)	43 (+5 dental)	474
Add: private staff (missions, companies, etc.)	16	8	119
TOTAL	35 (+2 dental)	51 (+5 dental)	593

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[1] Mainly technical staff for surveys.

[2] *North Borneo Annual Report, 1962.*

By the 1964 estimates the Government Division I staff had risen to 34 (+4 dental), including 21 medical officers and 8 specialists; Division II staff to 93, and Division III staff to 482. The 1964 total of 34 fully trained doctors plus 16 in private employment or practice gives a total of 50 to 510,000 population, a ratio of 1 : 10,200.

There has evidently been a fairly sharp improvement in staffing since 1962. All doctors have to be trained overseas, but there is a good range of training for many other grades of staff. The School of Nursing is recognized by the General Nursing Council in England, but the Midwifery course has to be taken overseas. School Certificate is required for entry into nursing training, though exceptions are made for some Junior Certificate girls. Many Filipino girls apply for nursing training but have difficulty over English. Laboratory technicians are trained jointly with Sarawak. Health inspectors have two years' local in-service training, followed by one year in Singapore.

In 1962 there were 671 beds in general hospitals and 542 beds in cottage hospitals.

The Sabah Health Service has considerable achievements, notably the great success of the malaria eradication campaign. It will clearly need to expand steadily, as finance permits. By 1970 it would be a reasonable aim to achieve a figure of 1 doctor to 7,000, which implies about 70 in Division I, plus 20 doctors in private practice.

Staff in 1970 might be estimated as 70 Division I, 130 Division II and 700 Division III.

Technical services

Staff (1964 draft estimates) for the main government technical departments were as follows:

	Division I	*Division II*	*Division III*
Public Works Department	47	69	119
Railways	5	6	96
Post and Telegraphs	10	19	184
Road Transport (not construction)	1	7	6
Development staff	—	40	16
TOTAL	63	141	419

The road programme in Sabah is of extreme importance (M.$41 million in the plan), perhaps especially the planned road link between the west coast and Sandakan. Moreover, there is also a massive construction programme, and by late 1963 there was considerably more work out to tender from the Public Works Department than the total capacity of Sabah's contractors. There is not only a shortage of unskilled labour but an acute shortage also of apprenticeship and trade school training for artisans. On the senior staff of the department there were, in 1963/64, 30 expatriates (including 6 Asians) plus 11 European inspectors of works. All the technical assistants and engineering staff were Indian, Tamil or Ceylonese. There was a shortage of 40 fitters in workshops and this was likely to rise to 100 in 1964.

In 1963 there was a trade school with 100 students enrolled and a full trade testing system, as well as an in-service training scheme in the Public Works Department. But it has proved extremely difficult to attract recruits to technical work, either at artisan or technician level; shops or government service attract most of the Chinese who might be qualified educationally.

This situation will be improved by the opening of a second trade school in Sandakan; but it is serious and will become more serious, especially if the building boom in Jesselton continues (as it may well do, since Jesselton is the State capital and government itself is sure to expand).

It has been suggested in the Sarawak survey that a proper technical college going to 'diploma' level is needed for Sabah and Sarawak jointly, and the Sabah situation emphasizes the need for this. Although the shortage of artisans and labour may be alleviated by importing contractors with their own technical staff, sooner or later Sabah should produce its own.

Estimates of requirements for 1970 might be 80 Division I, 190 Division II, and 500 Division III.

General administration

The staff (1964 draft estimates) for all government departments, excluding the groups already mentioned, and excluding education officers and other teachers, amounted to 173 Division I, 197 Division II, and 746 Division III. There is no evident reason why any of these departments should expand very greatly. As the country develops, more administrative and particularly executive staff will be needed in the residencies; the judiciary may need to be increased slightly, and there may well be increases in the Marine, Geology and Aviation Departments as general economic development goes ahead. Some allowance should be made for officers for the armed forces and for personnel who may join federal services outside the State. Total figures for 1970 might be 190 Division I, 240 Division II, and 900 Division III.

Teachers

Teachers available in 1962[1] are shown in Table 32.

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[1] *North Borneo Annual Report, 1962.*

TABLE 32. Distribution of teachers, 1962

Educational level	Primary		Secondary		Total
	Trained	Untrained	Trained	Untrained	
Graduate	80	95	95	[illegible]	337
Passed secondary	349	386	59	[illegible]	857
Not completed secondary	514	655	13	7	1 189
	943	1 136	167	137	
TOTAL	2 079		304		2 383

In 1962, 85 teachers passed their final examination from the teacher-training college (Kent College, Tuaran), of whom 30 were in the English course, 29 the Chinese course, and 26 the Malay course.

In 1962 a teacher-training centre was opened in Jesselton for teachers in native voluntary schools (locally provided but grant-aided 100 per cent on salaries and textbooks). In 1963 the new teacher-training college (Gaya College) was opened on a magnificent site in Jesselton. The college will take 240 students in residence on a two-year course for work in primary and junior secondary schools, with some proportion specializing in the teaching of English. Entry will be at School Certificate level, whereas Kent College entry is at Junior Certificate. The combined output of Kent and Gaya Colleges is roughly 200 teachers per year as a maximum, teaching up to form 3.

The supply of new teachers up to 1970 would therefore be approximately:

1963-65	Kent College	80×3 =	240
1966-70	Kent College	80×5 =	400
1966-70	Gaya College	120×5 =	600
			1 240

To this must be added teachers returning from overseas training (about 60 senior secondary teachers in 1963 were overseas). If this service is more heavily used (and it involves recruiting pupils with good School Certificates for whom there will be heavy competition), it might provide an extra 20 teachers per annum (on the average).

Departmental estimates of teachers required up to 1970 were not available at the time of writing. But while primary schools can only hope to expand to about 90 per cent of the available age groups, and are already running at 70 per cent, secondary education should expand much faster. Thirty new secondary schools are planned by 1970, and this may prove an underestimate. As a guess, the figures might then be: 10,000 pupils in primary VI, 3,500 in form 1, 1,500 in form 5 (School Certificate), and 500 in form 6,[1] the total secondary enrolment being 13,500; thus a stock of 3,500 primary and 700 secondary teachers would be needed. The supply or requirement figures would therefore be:

Level	*Stock 1962*	*Wastage (30 % in 8 years)*	*Required stock*	*Output required*
Primary	2 080	600	3 500	2 020
Secondary	304	90	700	490

It is clear from the current output from teacher-training colleges that these figures cannot be met. There might be 1,200 for primary and junior secondary, but only about 160 or 180 from overseas training for senior secondary. In fact, in 1962 only about 12 per cent of qualified secondary teachers were locally born, and it is certain that Sabah will have to continue to rely on graduates from overseas countries for at least half of its senior secondary teachers for almost another decade, unless new arrangements are made (see below).

MANPOWER REQUIREMENTS AND EDUCATIONAL POLICY

Total manpower requirements to 1970

Manpower stocks in the public sector, described above, add up as follows:

	Division I	*Division II Diploma*	*Division III School Certificate or Junior School Certificate*
Agriculture, lands, etc.	100	180	600
Medical services	70	130	700
Engineering, technical	80	190	500
General administration	190	240	?700
Teachers	300	400[2]	3 500[2]
	740	1 140	6 000

Thus the 1970 public sector establishment would total 7,880. The hypothetical doubling of Category I and Category II manpower between 1960 and 1970 gave a stock figure for 1970 of 13,000, which would allow rather less than half to the private sector. It is in fact unlikely that the private sector would expand quite as fast.

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[1] Two years.

[2] This shows staff for secondary and primary schools respectively, rather than Division II or Division III staff.

The supply figures suggested were 5,100 School Certificate holders and above, against a demand of 8,430 additions and replacements of wastage in the decade; therefore, about 3,300 would have to come from Junior Certificate holders.

These figures, by themselves, imply that, if the number of posts requiring high-level manpower were doubled between 1960 and 1970, about five-eights of the additions and replacements could be filled by holders of School Certificate or above. The total proportion of Division I, II and III manpower (13,000) to population (600,000) would be 2.2 per cent. This is not a true percentage of 'high-level' manpower, because the stock would still contain, in both public and private sectors, a considerable proportion of men without full secondary education and with at most two years of post-school training.

Education policy

Language. The problem of language of instruction bedevils the educational system in Sabah in a peculiar way. Malay has been used as the language of the indigenous primary schools, although it is a foreign language to them. There have to be 'bridge classes' to bring indigenous pupils into the English-medium secondary schools. There is now a strong demand from indigenous parents for English to be used in primary schools, and one school has already been converted. This is sure to continue, with Malay taught as a second language. Meanwhile, the Chinese primary schools are taught in Mandarin Chinese (also a largely foreign language to the Chinese-dialect speakers) and again 'bridge classes' are used to bring Chinese students (though not all) into English-stream secondary schools. The logical (but not necessarily politically acceptable) answer would be to use English as the medium in all schools, with Mandarin and Malay taught as second languages, as appropriate.

The Sabah Government, with the aid of the Nuffield Foundation, Colombo Plan, Peace Corps and Voluntary Service Overseas staff is carrying out a specialized programme to improve English teaching: there are 4 specialist teachers, 22 Malay and 6 Chinese teachers studying in Australia, New Zealand and the United Kingdom who will return to strengthen this programme. How long Kent College continues to turn out Malay-medium teachers must depend on how quickly the indigenous schools are converted to English.

Better solutions of the language problem will enormously improve the quality and number of those able to reach the higher levels of education and manpower.

Higher education. It has been suggested in the Sarawak report that there is room for four types of higher education shared between Sabah and Sarawak (as well as a special school of administration; see below):

1. An agricultural college going to diploma level; the site and facilities at Tuaran, Sabah, lend themselves well to such a project.

2. A school of education, going to diploma level; either Gaya College or Batu Lintang in Sarawak could be expanded.
3. A technical college—the needs of Sabah will be evident.
4. A school of forestry: it might be economic to attach this to the suggested school of agriculture, so that basic biological sciences could be taught at both courses, and so that research staff would share experience.

Training of indigenous administrative staff

In order to increase somewhat the possible proportion of indigenous to Chinese holders of high-level posts, it was suggested (Sarawak report) that a school of administration, with a three-year post-School Certificate course, including an overseas attachment, should be considered.

University college

The five suggestions for higher education and training—agriculture, forestry, education, technical and administration—all entered at School Certificate and running to 'diploma' level, are justified on manpower grounds alone. Combined with an output from sixth forms which will begin to rise towards the level of 250 per annum by the end of the decade, there would by then be the educational foundation for a university college of Eastern Malaysia, with a strong bias towards agriculture, forestry and education as the three highest priorities, and with a small arts and science faculty drawn from well-qualified sixth formers.

Whether the constituent institutes (apart from agriculture and forestry) should be centralized from the start, possibly alongside a centralized sixth-form college, or allowed to grow as most convenient in either State, so that the eventual university college would be geographically dispersed, would need very careful consideration.

Summary

It is worth relating more clearly the separate recommendations made for each of the sections of Malaysia.

Over-all targets for high-level manpower

Numerically, the analysis shows the following results:

Total population 1960	*Higher manpower*[1]	*Percentage*	*Population 1970*	*Higher manpower target*	*Percentage*
9 821 000	130 000	1.38	13 289 000	274 000[2]	2.0

These figures are high, and rest on a slightly generous definition of Category II manpower; the posts are there, but the educational qualifications of the holders in 1960 were below standard for Category II; the proportion of fully qualified holders should be 90 per cent or more by 1970.

Institutions

Post-secondary level. It is suggested that *Eastern Malaysia* should develop forthwith a series of diploma-level institutes with School Certificate entry. These would be: (a) an agricultural college; (b) a school of forestry, with research attached; (c) a technical college; (d) an institute of education; (e) an administrative training institute. In due course these could form the nucleus of a university college of Eastern Malaysia, about the time when Higher School Certificate passes reach 500 per annum for Sarawak and Sabah combined. They would be joined by an arts and science stream, possibly in about 1970 or soon after.

In *Singapore* a second technical college may well be needed soon after 1970.

In *Malaya* a second and possibly a third technical college will be needed, to give eventually a combined output of 500 per annum, and probably also a commercial college in Kuala Lumpur. The Agricultural College at Serdang could be expanded to give an annual output of 100 students.

University level. It would appear that Malaya will need two new university colleges, one as soon as possible (1967?) and one very soon after 1970. If one were to be in Penang, the second might well be in Johore and might to some degree be shared by Singapore. An agricultural institute on the east coast of Malaya would certainly be desirable. Eastern Malaysia will need a university college by about 1970/71.

Total enrolments at university level in Malaya should reach 10,000 by

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1. Category I plus II.
2. Sabah 13,000, Sarawak 18,000, Singapore 115,000, Malaya 128,000.

1972 and total output about 3,000 by that time; to this must be added enrolment in Singapore University (about 5,000) and Nanyang University (about 5,000?). This would give 20,000 students enrolled from a population of about 13.5 million, i.e., 0.15 per cent.

Subject priorities

If the targets suggested in earlier sections are accepted, the implications are as follows.

The first priority is the production of university graduate teachers for secondary schools, and this should be a first call on the arts faculties of all the colleges.

Second, a large increase in agricultural field and research staff would be needed in Malaya and Eastern Malaysia. The solution is not entirely in expanding the numbers taking an agriculture degree but in expansion of the natural science departments at both undergraduate and post-graduate level. Serdang College would have to aim at an annual output of 100.

Third, expansion of technical and commercial training, in Singapore especially, but also throughout Malaysia. Three new technical colleges would be needed, one in Eastern Malaysia, one possibly in North Malaya, one later in Singapore.

Fourth, a second university faculty of engineering would be needed in Malaya, making three in all.

Finally, if Malaysia is content to accept a doctor-to-population ratio of 1 : 5,000, a third medical school should not be necessary. To improve this ratio to 1 : 2,500 a third school would be necessary some time after 1970.

All-Malaysian institutions

It may appear that not enough attention has been given to institutions serving the whole of Malaysia from a single centre. In fact, however, the three universities (Kuala Lumpur, Singapore, Nanyang) at present and for some years will serve Eastern Malaysia; I have no doubt that post-secondary 'diploma' training should be locally developed there. The case for centralized institutions is, naturally, applicable to highly specialized work, with relatively small numbers, which is uneconomic to duplicate—not for the basic educational system. As such, it will tend to come later, at post-graduate and research level. It is certainly important that post-graduate work should be concentrated, probably in Singapore and Kuala Lumpur, and balanced. There may well be a case for building forestry up as the speciality of the Borneo States; technology in Singapore; administration, education and some agricultural subjects in Malaya.

Indonesia

GENERAL

The vast extent of Indonesia, the time of troubles and change through which the country has been passing over fifteen years or more, and the difficulty of assembling detailed information mean that only the broadest picture can be drawn of its economy and manpower needs. The Government is engaged, under enormous difficulties, in laying the very foundations of an educational and economic system fit to bear the weight of 100 million people. Metaphorically, the sites are laid out for schools, universities, and industries, which one day will be completed, equipped and staffed. Since Independence there has been a remarkable advance; but today it is not surprising if some projects are half-built, some half-filled, some in temporary buildings with borrowed staff, some still on the drawing-board. Despite difficulties, delays, mistakes, there is, in education certainly, a huge achievement: nearly 10 million children in primary schools, 15,000 high-school teachers enrolled for training, 16 State universities. Indonesia must be measured broadly and generously by potentiality rather than by final achievement at this stage of her nation-building programme.

At the present time, the country, with its rich economic potential and able people, is held back economically—partly by the weight of military expenditure, certainly over 70 per cent of the budget; by foreign exchange difficulties and internal inflation, partly due to this military spending; and by the grave fall in output from agriculture, started by the war and continued by unsettled conditions and lack of managerial training through the post-war period up to today. In consequence, large parts of the agricultural economy have fallen back to the safety-net of subsistence production, and the planned growth of industry is throttled by lack of imported spare parts and equipment. The restoration of food production, so that rice no longer has to be imported, and the restoration of export crops and export minerals must be the first step in gaining foreign exchange and internal stability, without which the great plans for development cannot move forward.

Nevertheless, these difficulties will one day be overcome; and a structure of education and training must be built wide and strong enough to support the great economic and social growth which should be within Indonesia's grasp.

THE ECONOMY

The 1961 Census has shown a population for the whole country of 97.1 million. The growth rate is thought to be about 2.3 per cent per annum. Future totals have been estimated as 109 million in 1966, 120.9 million in 1971 and 134.7 million in 1976.

It is difficult to give an accurate picture of gross national product in terms of world currencies or of internal purchasing power, owing to inflation. It was approximately 2,300 rupiahs per head in 1959,[1] and it has probably not been keeping up with population growth in real terms since then, since the economy has been in many difficulties.

The most serious economic factor is the heavy fall in agricultural production compared with pre-war levels. Even by the late 1950's it has been estimated that plantation crops were 66 per cent down as a whole in comparison with 1940.[2] There are, however, more encouraging figures in the progress of some food crops between 1951 and 1960 (see Table 33).[3]

TABLE 33. Crop outputs (in 100 000 kg.)

Crop	1951	1960	Crop	1951	1960
Paddy	119 686	164 233	Peanuts	1 946	2 522
Maize	13 980	24 864	Soya	2 761	4 371
Cassava	71 338	111 419	Sweet potatoes	13 031	27 089

The rice crop was hit by disastrous floods in 1961 and, after some recovery in 1962, was again inadequate by 1963/64, so that serious shortages and import requirements were again troubling the country. Accounts of the plantation crops, vital to export, including rubber, tea, coffee, tobacco, sugar, were still sadly discouraging. The *State Plantation Enterprises Report* for 1962 noted a continuing decline of 'from 10 per cent to 30 per cent' in output, although there was some recovery in sugar and coffee in 1963. Although Indonesia is gradually creating new outlets for the rubber crop, 'confrontation', which cut the traditional channels to Singapore and Malaya, has further reduced export earnings (11,803 million rupiah in 1963 against 13,433 million rupiah in 1962).[1] Moreover, the stock of rubber trees is old, and replanting is slow; the *Humphreys Report* recorded that over half the trees were over 35 years old.[2] The prospect of falling prices for natural rubber and the stiff competition from high-yielding young plantations in Malaya and elsewhere will make it difficult to put the Indonesian rubber export industry back on its feet for some years at least.

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[1] It is almost meaningless to translate rupiahs into United States dollars or pounds sterling; in terms of purchasing power, this sum might be held equivalent to £15 or perhaps £20 per head.

[2] *Far Eastern Economic Review, 1963 Yearbook.*

[3] *Statistical Pocketbook of Indonesia, 1961.*

The industrial picture is in certain respects more encouraging. Indonesia was not heavily industrialized: manufactures represented in 1959 about 8 per cent of gross national product. The distribution of the employed population in 1961 is given as follows: agriculture, forestry, fishing, 23.52 million (71.9 per cent); mining and quarrying, 0.08 million (0.3); manufacturing, 1.86 million (5.7); construction, 0.58 million (1.8); electricity, water, gas, 0.05 million (0.1); trade, banking, insurance, 2.19 million (6.7); transport, storage, communication, 0.69 million (2.1); services, 3.09 million (9.5); others and unknown, 0.63 million (1.9); total 32,708,614.

The notably high figure in this list, apart from agriculture, is that for services, largely accounted for by government employment. Some figures (extremely miscellaneous in date) for government employment are:[3] central government (1959), 509,000; provincial government (1953), 692,000; government enterprise (1960), 216,317; temporary employees (1960), 470,000. Government enterprise includes railways (81,000), posts and telegraphs (33,000), agricultural estates (36,000), tin mines (14,000), salt mines and soda (11,500), naval (establishment 11,000). These will by now have been increased. These enterprises include quite a large section of the posts where engineering and other technical skills are required.

Analysis of type of manufacturing industry by total number employed in 1959 shows, from a total employment of 430,000 (in firms replying to the questionnaire, mainly the larger ones), the following orders of magnitude:[4] food manufacturing, 50,700 employees; tobacco manufacturing, 84,200; textiles manufacturing, 65,600; wearing apparel, etc., 38,700; chemicals and by-

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1. *Far Eastern Economic Review*, 30 Jan. 1964.
2. Visiting American mission, published by Yale University, South-East Asia Studies, 1963.
3. Paper for Bangkok Manpower Conference (ECAFE), October 1963, from 1961 Census.
4. *Statistical Pocketbook of Indonesia, 1961.*

products, 29,700; printing, 22,400; rubber manufacturing, 22,500; transport equipment, 19,500; metal products (excluding machinery and transport), 15,500; leather, 10,900; total 359,700 (84 per cent).

The low place of metal products is notable. Manufacture and repair of all types of machinery, including electrical, did not reach 10,000 employees. These figures probably do not include the large military and naval installations.

In recent years there have been encouraging increases in some industries such as cement (15 per cent rise, 1960-61), timber, glass, salt, paper, shipbuilding, batteries. Tin mining, however, has fallen seriously, from a level of 35,861 tons (metal content) in 1954 to 17,310 tons in 1962 and 10,683 for the first ten months of 1963. The tin industry is a vital foreign-exchange earner (over 50 per cent of all foreign exchange) and a considerable employer. The United Nations Special Fund is to finance a survey.

Finally, there are major new projects, including six paper mills, iron and steel at Tjilegon and in Kalimantan, the great French dam between Djakarta and Bandung, an atomic reactor at Serpong, a 200,000-ton phosphate fertilizer plant at Tjilatjap, oil development[1] and many smaller industries. The completion of these projects will lay a basis of heavy industry, but this is still some years ahead. The major demands for engineering and other industrial manpower will be in the smaller industries; the most difficult to fill will be in the large ones.

THE EDUCATIONAL SYSTEM

Primary

There were 9.5 million children enrolled in primary schools (I to VI) in 1961/62, of whom probably over 8 million in public and over 1 million in private schools. This represents probably from 50 to 60 per cent of the age-group. About 45 per cent of children entering standard I reach standard VI. In 1960, 530,234 sat for the leaving examination and 110,391 passed.

Secondary

Secondary education is divided into two three-year periods (junior and senior). Enrolment figures for junior secondary in 1960/61 were: general, 448,000 (form 1, 179,179; form 3, 124,369); vocational and other, 170,000; total 618,000. About 45 per cent pass the terminal examination at form 3.

Enrolments in senior secondary, 1959/60, were: general 137,279 (state, 50,517; private, 86,762); vocational, 55,578; total 192,857. There were about 60,000 final passes, eligible for university entrance, in 1962/63.

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[1] Oil production is said to have risen from 4 million tons in 1956 to 7 million tons in 1961—a most important advance.

University

Growth in university education has been so fast and changing that, particularly for the private institutions, figures are approximate, in the sense that some may be omitted. There were by 1962/63 16 State universities and about 240 faculties in private colleges and universities. In addition, there are the academies, post-secondary training institutions run by various government departments. There are over 40 of these, but enrolment figures are not available.

University education takes place in five stages, of which only the first four are of major importance here. Stages 1 and 2, taking at least three years, are the *kandidat* stages, leading to a first degree, called *sardjana muda* or sometimes *bakaloreat*. The next two stages lead to the *doctorandus* degree, called *sardjana*. Thereafter several more years may lead to a doctor's degree.

Growth has been very rapid: enrolment for 1959/60 were 37,738 State and 6,183 private, total 43,921; in 1961/62 there were 66,330 State and 29,000 private, total 95,000. Table 34 shows the distribution by faculty for 1962/63.

TABLE 34. Enrolments by faculty, State and private universities, 1962/63

Faculty	State	Private
Law	12 888	5 435
Economics	8 355	5 028
Medicine	8 135	1 220
Technology	5 762	1 743
Agriculture	2 211	232
Letters	2 728	2 732
Teacher training and education	4 615	3 574
Veterinary	844	—
Mathematics	1 193	290
Others	14 222	8 806
TOTAL	60 935[1]	29 060

[1] Ten universities only. The additional four new universities, with an allowance for growth at Andalas, might raise those figures to about 67,800 in 1962/63.

About 45 per cent of all enrolments were in the first stage in State universities and about 67 per cent in private universities: total 47,184 out of 90,000. It is thought that about 37,000 students entered universities in 1962/63.

Output from universities is calculated roughly on the percentages of students who pass the first degree (*sardjana muda*) and the second (*sardjana*), and these are roughly estimated as, for 100 entrants, 45 *sardjana muda*, 17 *sardjana* (State), and 100 : 30 : 15 (private). Roughly 2-3 per cent of total enrolment reach the *sardjana.*

The outputs of full *sardjana* degrees expected for State universities (eight-year plan), which correspond to these rough percentages, are shown in Table 35.

TABLE 35. Planned outputs for State universities (*sardjana*)

Faculty	1959/60	1962/63	1964/65
Law	150	350	500
Economics	100	250	400
Medicine	330	520	695
Technology	170	225	300
Agriculture	130	200	215
Sastra	45	100	150
Pedagogy	20	50	75
Veterinary science	45	90	120
Mathematics/physics	30	50	100
Other	210	300	380
TOTAL	1 230	2 135	2 935

To these must be added, at least for 1964/65, possibly 300-500 graduates from private universities. It must be stressed that these are full *sardjanas,* representing at least five years' university study. The first degree (*sardjana muda* or *bakaloreat*) would give more than twice this output. There is an extremely wide margin of error in these figures.

It will be noted that, of the total enrolments in 1962/63 (State and private), law and economics together total 31,706 out of 90,000; agriculture only 2,443. The planned proportion of graduates in 1964/65 (900 to 215) is, however, much more favourable to agriculture. It would appear (since 1964/65 graduates come from 1959/60 entrants) that the enrolments in 1962 will involve a much increased law/economics percentage of graduates in 1967/68.

SPECIAL MANPOWER REQUIREMENTS

Agriculture, veterinary, forestry

There are five agricultural and two veterinary faculties with known enrolments and another five agricultural faculties listed, for which figures are not available. Known enrolments were 3,055, and about 200 degrees were granted in 1962/63.

Below this level there are staff from agricultural schools, some of whom may go to one of the two agricultural academies. The schools produce about

500 a year, but a proportion go on to seek a degree at the university. No figures of the field agricultural staff at degree or diploma level for Indonesia are available, but it is believed to be extremely low—probably not more than 350-400 at the degree level; the private estates probably secure more than the Government.

At the lowest level, about 6,000 post-primary students were given a one-year course for the People's Agricultural Service but it is not known if this scheme is continuing.

There is little doubt that the whole agricultural advisory, extension and research service is in urgent need of overhaul and expansion, probably at all levels, but particularly for field officers. It is almost impossible, without a technical survey, to guess the numbers at each level which might be required. By analogy with the proposals made for the Philippines, and suggesting initially about double the target, Indonesia might need a field force for agriculture, forestry, veterinary and fishery of about 2,000-2,500 graduate officers, supported by a research, specialist and teaching force of 5,000—say 7,000 graduates. To the field force would correspond a middle level of about 5,000 diplomates in the field and perhaps 3,000 in supporting services, and a force of field assistants of 30,000-35,000. The annual outputs necessary to reach these numbers over ten years are 700 graduates, 900 'diploma-level', 2,500 field assistants. It would take time to build the organization, research and training facilities for such a force, and it would probably be unwise to attempt to reach these totals in ten years from a starting point of 215 expected agricultural and 120 veterinary graduates in 1964/65. If the graduate output could be raised to 600 per annum by 1971, with a comparable growth of 'diploma' training, that would be a thoroughly satisfactory start. Policy and organization are, however, of key importance, as are practical field training and experience, The research staff would not have to be in agricultural faculties, at least for the first degree; thus the biology and other natural science departments would contribute two-thirds to the total output suggested. The agricultural, veterinary and forestry field graduate staff (2,000) could be produced in ten years or less from a level of 200 graduates per annum, added to whatever stock now exists.

The problem of supplying teachers in agricultural faculties is acute, particularly as they cannot supplement low salaries by outside professional work. If Indonesia is willing to tackle agricultural advance seriously, this would be the first point of attack. It may involve borrowing, more overseas scholarships, higher salaries for agricultural teaching staff, and real incentives to agricultural field staff.

Medical

There were perhaps 1,500 doctors in Indonesia in 1960, giving a ratio of less than 1 : 60,000 population. The output in 1959/60 was about 240, planned to rise to 500 per annum by 1964/65. The principal difficulty in increasing output is the shortage of teaching staff, and this can only be remedied in the short term by engaging foreign staff until the universities can begin to supply both the large field force and a reserve for teaching.

If we start from a supposed figure of 3,000 doctors in 1965 (1,500 plus 1,800 output 1960-65, less 300 wastage), and an annual output of 500 in 1965, a first target might be to increase annual output to an average of 700 in the period 1965-70 and an average of 1,200 in 1970-75. The figures would work out as follows:

Stock 1965	*Wastage to 1970 (20 %)*[1]	*Output 1965-70*	*Stock 1970*	*1970 ratio (118 m. pop.)*
3 000	600	3 500	5 900	1 : 20 000

Stock 1970	*Wastage to 1975 (20 %)*	*Output 1970-75*	*Stock 1975*	*1975 ratio (132 m. pop.)*
5 900	1 180	6 000	10 720	1 : 12 500

On this pattern, output per annum would have risen to 1,500 doctors per annum by 1975.[2] This output would, if remaining constant, increase the supply of doctors slowly to 16,000 in 1980, about 1 : 9,000 population.

This is probably too fast a rate of growth to be practicable whatever efforts are made—it involves increasing the output of doctors by 100 per annum every year from 1965 to 1975. In practice, growth in the early stages would necessarily be slower, but there should be greater acceleration later. An average of 600[3] per annum in 1965-70 and of 1,100[3] in 1970-75 would give (by the same calculations) a ratio of 1 : 22,000 in 1970 and of 1 : 13,300 in 1975, with an annual output of 1,500 in 1975. These figures represent a huge improvement, if they could be achieved. It must be remembered that these rapid increases in medical staff involve comparable expansion in ancillary services, hospitals, transport, drugs and equipment—a very large bill, much of it in foreign exchange. Above all, the problem of teaching staff would have to be solved.

Engineers and technologists

There were in 1962/63 two institutes of technology (Bandung and Surabaya), five State university faculties and ten faculties in private universities. The total enrolment in State universities and the two institutes was 9,072, of which Bandung accounted for 5,014. No reliable figures are available for the private faculties, save that given in Table 34—1,743.

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1. Wastage here calculated in two five-year periods. One ten-year wastage of 1965 stock would give a stock of 11,300 in 1975 and a proportion 1 : 11,700.
2. Outputs 1965-69 = 500, 600, 700, 800, 900; 1970-74 = 1,000, 1,100, 1,200, 1,300, 1,400.
3. Outputs 500, 550, 600, 650, 700; and 800, 900, 1,100, 1,300, 1,500.

Expected outputs for State institutions at *sardjana* level are 300 technology, 125 chemistry/biology, 100 mathematics/physics—525 by 1964/65. There are considerable plans for expansion, and it must be remembered that three times as many first degrees (*bakaloreat* or *sardjana technik*) may be produced, and this would represent a satisfactory technician level, with 15 years of education, the last three specialized. There is some doubt, however, whether this *bakaloreat* qualification is recognized in technical subjects.

Clearly Indonesia will need engineers, scientists and technicians. But the need is neither so rapidly expanding nor so fundamental to economic growth as the need for an agricultural service. It might almost be said that industry will only be able to expand if agriculture earns the foreign currency for it. An output of 400 fully professional engineers per annum, matched by an output of 1,200 technicians of good quality might be enough to look after the expansion of industry for some time to come. Since this is well within Indonesia's capacity, and might easily be exceeded by ambitious expansion, a more detailed survey of needs in a dozen key technologies might be extremely valuable at this stage, so that proper targets could be set. The requirements of the armed forces would have to be carefully estimated, since many of the cream of technical personnel are pre-empted for them. If Indonesia should no longer feel it necessary to carry such heavy expenditure and manpower for military operations, a considerable hidden reserve of technical personnel could be released for the civil economy. In the longer perspective, however, from 1970 onwards, provision would be needed for an output of at least 600 engineers and 300-400 physical scientists per annum.

Teachers

Nine State universities have faculties of education, some specialized to physical or technical education. In 1961/62 another 25 faculties were listed in private institutions, with a total employment of about 2,500. Total enrolment in 1962/63 is approximately 13,000 for State universities and 2,500 private, total 15,500. Teachers may take a three-year course to the *bakaloreat* or *sardjana muda,* or a five-year course to the full *sardjana.* Both qualify for teaching in senior secondary schools, the latter at higher salaries. Some of those with *sardjana* would obviously proceed to doctorates for university teaching.

The total number of graduates has risen from 8 *bakaloreat* in 1953/54 to 554 *bakaloreats* and 72 *sardjanas* in 1959/60. Expected outputs are: 230 *sardjana* and 1,100 *bakaloreat* in 1962/63; 315 and 1,300 respectively in 1964/65. In addition there would probably be upwards of 1,000 B.I[1] graduates by 1962/63.

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[1] B.I and B.II courses were originally offered directly by the Ministry of Education, but have now been absorbed into State universities. They very roughly correspond to a teaching qualification at *sardjana muda* (B.I) or *sardjana* (B.II) level.

In 1959/60 it was reported that there were about 900 B.I and 800 B.II teachers in senior secondary schools, over 3,000 teachers without full qualifications, and over 5,000 vacancies. The total of students enrolled in senior secondary was then 137,279, plus 55,600 in secondary vocational; 9,700 teachers would give a teacher/student ratio of 1 : 20—in fact, with 5,000 vacancies, it would have been 1 : 40.

No reliable forecast has been made of the total enrolment in senior secondary general and vocational schools for 1965 or later dates. If we take an enrolment of 180,000 in form 1 (junior secondary) in 1960/61, it would be likely (on the basis of past examination results) to lead to an entry of about 32 per cent (i.e., 57,500) to form 4 in 1963/64 (excluding vocational schools) and a total enrolment of about 150,000 as against 137,000 in 1959/60. This is, however, a slower rate of growth than senior secondary has in fact shown (about 13 per cent per annum). It would not be unreasonable to assume figures of the following order:

	1965	*1970*
Senior secondary (general)	170 000	250 000
Senior secondary (vocational)	70 000	100 000
	240 000	350 000

This total would involve planning for 12,000 senior secondary teachers by 1970, on a teacher/student ratio of 1 : 30. This would involve an average output of about 1,000 teachers per annum during the decade, assuming a stock of 3,000-4,000 trained teachers at 1960. Planned outputs are about 1,300 in 1962, rising to 1,600 in 1964/65. If the assumptions for expansion to 1970 are correct, or even if the 1970 total enrolment were as high as 450,000, the supply should be adequate.

Stock 1960	*Wastage to 1970 (40 %)*	*Output 1961-70*[1]	*Stock 1970*	*Ratio to 450 000*
?4 000	1 600	16 000	18 400	1 : 24.5

Other faculties

There is no doubt that Indonesia will be adequately, if not amply, supplied with lawyers and economists, both extremely popular faculties. There is, however, equally little doubt that, on the present balance of enrolments, there will be an acute shortage of science degrees, for teaching, for agriculture, for industry and for the researches supporting medicine. A proportion of 60 science to 40 arts would be a much better target to aim at, and it involves a radical alteration of the present system, in which law and economics dominate the whole university picture. However, such a rapid switch would not be advisable if it involved a reduction in standards on the science side.

[1] Outputs: 1961, 1,000 ... 1965, 1,600 ... 1968, 1,900 ... 1970, 2,100; total 16,000.

Total university outputs

If the suggestions for four main sectors—agriculture, medicine, engineering/industrial technology, and teachers—are accepted, the rough outline of an annual university output level for 1970 can be sketched: agriculture and supporting sciences, 600-800; medicine and supporting sciences, 1,000 (700 doctors, 300 scientists/teachers); engineering and technology, 700-1,000; teaching, 2,000-2,200; other arts, 2,000; other science, 3,000; total 9,300-10,000 per annum.

By 1970, the enrolment in universities will certainly have reached 150,000, and quite possibly a considerably larger number, and it should be possible to improve the rate of final graduation to 6-7 per cent of enrolments. If a proportion of the graduates are at *sardjana muda* level (as they may well be for teaching and for some agricultural posts), this output is even more reasonably to be expected. It would seem that expansion of the university population beyond this total might well result in creating unemployment. It would certainly overstrain the resources of university teaching staff, which are at the present time desperately short.

CONCLUSION

Over-all high-level manpower

The 1961 Census contained tables of population 10 years and over by level of education ever attained. This gives the following figures: general and vocational senior secondary, 386,924; academies, 34,580; universities, 21,257; total 442,761. If we take the 1962/63 population as 100 million, this gives a stock of 0.44 per cent of total population having had secondary or higher education. Extremely rough calculations based on the number of professional, technical and related workers, and administrative and related workers, from the figures published for employed population in Java and Madura, suggested a figure of 0.5 per cent of total population. Unfortunately, it is not possible to make even a rough shot at the total outputs from higher and secondary education separately, 1960-70; as a purely numerical exercise, it might be supposed that the senior secondary school output of 60,000 in 1962/63 would be doubled by 1970, giving an addition of about 750,000[1] graduates of senior secondary schools (some of whom would emerge from universities and other training) in the decade:

Stock 1960	*Wastage 40 %*	*Addition 1960-70*	*Stock 1970*	*Percentage of population 1970*
440 000	176 000	750 000	1 100 000	0.93

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[1] Outputs: 1960, 40,000; 1963, 60,000; 1965, 80,000; 1967, 100,000; 1969, 120,000 = 760,000.

This is not altogether an unlikely or unreasonable result, and it would imply a doubling of the proportion of potentially high-level manpower in Indonesia over the ten years 1960-70. Considering the rate at which education is now growing, this might well happen. Whether posts to employ this output are created depends upon the success of economic policy.

In terms of policy, recommendations would be:

1. Urgent and intensive concentration on the supply and training of teachers at university level for the faculties of agriculture (forestry, veterinary, etc., included) and medicine.
2. A great increase in agricultural field and research staff and equipment.
3. An effort to increase the output of doctors to 900 per annum by 1970 and 1,500 by 1975.
4. A target output of 2,000 per annum graduate teachers for secondary schools by 1970.
5. A moderate expansion only in engineering and technology, to an initial output of 400 degrees by 1970, rising to 600 later in the decade.
6. A reversal of proportions between arts and science faculties.
7. A target of only about 150,000 total enrolment in universities by 1970, with a target output of about 10,000 degrees per annum as from that date. An attempt to raise the proportion of degrees to enrolments to at least 6 or 7 per cent.
8. The development of technician training in all fields. Nothing has been said of this; but a proportion of at least three technicians to one graduate is required, and this involves large training arrangements.

I must underline the extremely large suggested output of ordinary science degrees, over and above those needed for the engineering, agricultural and medical fields. Quite probably this target is well beyond hopes of achievement; at present the universities seem to be concerned with technology almost to the exclusion of ordinary science. But if anything like the potential of Indonesia is to be developed, an extremely large number of young men have got to acquire the basic training from which a hundred different branches of technology and accurate competence spring.

Finally, I have made no comment on the probability of Indonesia achieving targets which are certainly theoretically possible. At the time of writing the prospects were black—inflation, food shortages, 'confrontation', shortages of foreign exchange. The administrative machine and services (telephones, communications, etc.) were all perilously in need of repair and maintenance in 1963; above all, agricultural production of export crops was still stagnant. But such situations can change greatly over five years, once a full national effort is directed towards the economy. This report is therefore directed to the potential of Indonesia: realization of this potential is in Indonesian hands.

Cambodia

THE ECONOMY

Population

A census was taken in 1962, giving a population of 5,748,000; no further details of the census have been released. This is a considerably higher figure than that projected by United Nations calculations based on mortality and fertility rates. For the purpose of this study the more conservative United Nations estimate is adopted (since its growth rates are more realistic), with an addition of 10 per cent to allow for the fact that the base-line figure adopted by the United Nations may have been too low. The results are: 1960, 5,447,200; (1962), (5,744,000); 1965, 6,217,000; 1970, 7,300,000. The 1970 figure must obviously be treated with great caution.

Economic growth

The gross national income of Cambodia was roughly estimated to be in the order of £175 million[1] (1962), giving an income per head of about £30-£32 on a population of 5.5-5.75 million. In real terms this is probably too high a figure of income. Possibly £25 would give a better comparison with the figures elsewhere in South-East Asia (i.e., Thailand).

Cambodia has been spending heavily on development, with the result that balance of trade figures have lately been increasingly unfavourable, and even alarming; the adverse balance rose from 343 million riels in 1959 to 1,679 million riels in 1962. The cessation or massive reduction of American aid (about U.S.$20 million per annum) will accentuate this danger, although some part of the loss will no doubt be made up by France and possibly by increased aid from China.

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[1] Converted at 100 riels to £1.

The economy is overwhelmingly agricultural, and 70 to 75 per cent of all exports are accounted for by rice and rubber. The rubber crop, largely grown on French plantations, is excellent, with some of the highest yields per acre in South-East Asia and a very young average age of trees. The paddy crop, in contrast, is of poor yield and the export quality is poor; it is mainly sold to India. Paddy is grown by traditional methods, and attempts to improve productivity have not as yet been successful. Leaving aside estimates that the production per acre could be increased fivefold, it is clear that even doubling productivity would give a large bonus of export and foreign exchange. Agricultural production (1962) is shown in Table 36.

TABLE 36. Agricultural production, 1962

Crop	Tons	Index (1960 = 100)	Crop	Tons	Index (1960 = 100)
Paddy	1 600 000	109	Coconut (nuts)	22 680 000	113
Red maize	150 000	139	Groundnuts	12 450	588
White maize	32 000	305	Sesame	11 770	298
Potatoes	27 000	141	Soya	9 626	381
Manioc	13 400	82	Rubber	41 200	122
Haricot beans	20 600	266	Tobacco	6 000	106
Sugar-cane	440 000	142	Cotton	3 600	62
Sugar palm	47 000	84	Jute and kapok	8 450	133

These figures show highly satisfactory increases (save for cotton), no doubt partly accounted for by a good season, but mainly due to increased effort and efficiency. Cotton reached a sudden peak of almost 30,000 tons in 1961, when an incentive was offered; but the Government failed to buy more than a fraction of the crop and the production crashed to 3,600 tons in 1962.

There is clearly a high potential in Cambodian agriculture: even if the fall in rubber prices neutralizes any financial gain from increased production, rice proceeds could increase greatly, and vegetable oils, cotton and fibres could all assume far greater importance. There is also plenty of room for development of forest products.

Industry consists of a very few plants, mainly established by foreign aid; a certain number of back-street engineering workshops in Phnom Penh; and some small cottage industries and production for the tourist trade. The main factories established or under construction are: a cotton mill, a paper mill, a cement works, and a plywood plant (all with Chinese aid), a sugar refinery (Czech-aid), a tyre factory, tractor assembly (at Sihanoukville), and a brickworks. There are proposals for an oil refinery at Sihanoukville, another textile mill and jute gunny-bag plant. Japanese contributions have mainly been in expertise and infrastructure, and French in the provision of administrators and experts and in the building of Sihanoukville. The Russians have built a hospital and a technical institute. British aid has been mainly small, in the provision of staff by the Colombo plan. Prince Sihanouk has impressed upon Cambodia the need for self-help and there have been impressive exhibitions of local achievements under the title '*Le Cambodge s'aide lui-même*'.

The largest enterprises are in the infrastructure, including the railway under construction to Sihanoukville, the road on the same route, communications across the Tonle Sap (the Japanese have constructed the bridge, but there is as yet no road), several large irrigation schemes in the planning stage, and the completed port of Sihanoukville, which handled 166,000 tons in 1962. The loss of American aid will delay or curtail some of these projects.

The indications would seem to be that Cambodia will need a pause in major capital expansion on infrastructure until there is a little more superstructure for it to carry. In particular, agricultural advance and the processing and export industries which could grow with it could carry the country a long step forward economically and provide a basis for a further instalment of capital investment. Expenditure on roads necessary for marketing of agricultural and forest crops would therefore be the main justifiable 'infrastructure' expenditure for the immediate future. The educational system has taken a great leap forward over the last ten years, and here again consolidation of the secondary system and some advance in higher education will provide Cambodia with the trained manpower—still very scanty—which could be used in the late 1960's and early 1970's to carry the responsibility for further technical advance.

THE EDUCATIONAL SYSTEM

There has been an extremely rapid growth in education over the last ten years, primary enrolment having risen by over threefold between 1951 and 1961, and secondary enrolments almost tenfold between 1953 and 1961.

Primary enrolment (I-VI): 590,360 (166,094 standard I, 44,130 standard VI).

Secondary enrolment (1-7): 47,059[1] (18,460 form 1, 6,954 form 4, 233 form 7).

About 12 per cent of primary enrolments are in pagoda schools; total enrolment represents about 54 per cent of the age group. The largest fall-out is between primary I (166,000) and primary II (98,200). In 1958/59 about 34,000 entered the primary VI leaving examination and 14,760 passed (*certificat d'études complémentaires primaires*).

In secondary education, the first main examination (*diplôme d'études*

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[1] *Lycées*, 11,293; *collèges*, 34,951. *Lycées* provide the full seven-year course to *baccalaureat 2*, *collèges* only the first four years. (Private schools are included.)

secondaires, premier cycle—D.E.S.P.C.) is taken from form 4. There were 2,160 passes in 1961/62 and 3,458 in 1962/63. The next stage is the first *baccalauréat* at form 6 (432 passes in 1961/62 and 550 passes in 1962/63), and the second *baccalauréat* at form 7 (119 passes in 1961/62 and 177 passes in 1962/63), which is the level for entry to degree (*licence*) studies in the university.

At the university level there are a number of faculties not yet really unified into a university system, but each slowly building a good standard of work. The main institutions, with student enrolments in 1962/63, are: Faculté de Droit, etc. (law and economics), 502; Faculté des Sciences et de la Technique, 110; Faculté des Lettres, etc., 205; Faculté Royale de Médecine, etc., 416; Institut National Pédagogique (senior course), 217 (total 775); Institut Royal d'Administration[1], 60; Ecole Nationale de Commerce (senior course)[1], 78 (total 331); grand total, 1,588.

Droit. In 1960/61 the faculty granted 35 certificates, *Capacité en droit,* taken at the level of the first *baccalauréat;* 11 *licences* (second *baccalauréat* plus three years) and 11 *doctorats* (additional two years).

Sciences. This faculty is mainly a pre-medical course in physics, chemistry and biology with, additionally, a course in physics, mathematics and chemistry and a general science course leading to a science degree. Just under 50 students were enrolled in each of the first two courses and 16 in the degree course.

Lettres. Founded only in 1959, this faculty is still housed with the teacher-training institute and its main outlet is towards teaching. About 5 *licences ès lettres* will be granted in 1964.

Médecine. The original function of the faculty was to produce health officers in a four-year course. Three further years of study in France was normally necessary for the full medical degree. Now, however, the full doctor's training is achieved in Phnom Penh. In 1963, 12 Cambodian doctors received their degree. In 1962, 117 were enrolled in the doctors' course, 188 for health officers; 38 for pharmacy, and 49 for dentistry.

Pédagogie. The institute gives a two-year course for secondary teachers (*professeurs*) and a one-year course for primary teachers (*instituteurs*). The output was, in 1962/63, 98 *professeurs* and 548 *instituteurs.* It also has courses for teachers of *classes pratiques.* (There is a more junior teacher-training college, for rural teachers, at Kompong Kantriot—the Centre de Préparation Pédagogique—with an enrolment of over 800 and output of 400 from a two-year course. A new centre may be established at Siemreap.)

Administration. The Royal School of Administration runs two courses, for entrants to the senior administration and to the middle ranks respectively. It also runs evening work for in-service training at both levels. In 1962 there were 20 in the senior and 40 in the junior course. By 1963 there were 209 candidates for 35 senior places and 838 candidates for 60 places in the junior course. Altogether nearly 200 had completed the in-service courses. The school comes directly under the President of the Council of Ministers and is therefore technically not part of the university.

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[1] Not part of the university.

Commerce. The National School runs courses at three levels: the first is a two-year course with post-primary (*C.E.P.C.*) entrance; the next runs to form 4 and the examination confers a *brevet d'enseignement commercial;* the senior course is at university level (three years post-*baccalauréat 2*) and awards a *diplôme d'enseignement commercial supérieur.*

In addition there are three main institutions of technical education. The Ecole Nationale des Arts et Métiers runs a four-year post-primary course to the *brevet d'enseignement industriel,* and a further three years leads on to the *baccalauréat technique.* About 700 students were enrolled in 1961/62, but the school is moving to new buildings and the aim is to increase enrolment to 1,800. Secondly, the Collège Technique de Kompong Cham runs a four-year course to the *brevet d'enseignement industriel.*

There is a huge number of applicants for places: 1,668 for 92 admissions in 1959. The enrolment in 1962 was 266. Thirdly, there is the Russian-provided Ecole Technique Supérieure, with *baccalauréat* entry, going to a full engineering qualification. It opened only in the last quarter of 1963.

Finally, there are two important schools, run by the Ministry of Works and the Ministry of Agriculture respectively, as follows.

The Ministry of Works Ecole des Ingénieurs runs three courses—the first for artisans, of 11 months, with an enrolment of 40; the second for technicians, with *baccalauréat* entry and three years' training, with 40 students enrolled who become *conducteurs de travaux publiques* in the Ministry; the third school is for civil engineers (not mechanical or electrical) and is a four-year course, the last two years being more specialized, and it leads to a professional qualification (20 were enrolled in 1963).

The School of Agriculture and Forestry[1] runs a three-year course for entrants from secondary 4 (*D.E.S.P.C.*). The students do practical work during their course and are sent out to various stations (crop, animal husbandry, etc.) for this. About 240 students have passed through the school since its inception and 197 were enrolled in 1963/64. The graduates work in the administration and in the research or farm institutes of the government agricultural service. There were 600 candidates for the 197 places. At a lower level, there is a school for *agents de culture* at Pregleap, 10 miles outside Phnom Penh; entry is from secondary 4 and the course is for two years. There were 3,000 applicants for 55 places in 1963. There is also a school for forest guards.

The School of Agriculture came directly under the Ministry and was restricted in numbers by the actual vacancies in the Ministry. It is probable that it will move into the university, and there are proposals that, from 1964, students will enter after *baccalauréat I* and study for five years to full professional standards. The school is much hampered by having entirely part-time staff, except for the director; there are, however, some FAO and some French experts who assist with teaching.

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[1] Ecole Nationale d'Agriculture, d'Elevage et de Silviculture.

EDUCATION AND MANPOWER POLICY

It would not be difficult to carry out a small survey of high-level manpower in Cambodia, since the great majority of Cambodians with higher education are in government service and teaching, for which figures could be quite quickly obtained. On the industrial side, again, the number of major factories is small and easily counted. In commerce, the senior group was partly Chinese, and there may be some alteration here. It would be worth while for the Cambodian Government to carry out a short survey, in order to estimate more closely the actual requirements of various skills, measured against the output from education and training. It was impossible for me to do this in a fleeting visit. If the full statistics from the 1962 Census, including a breakdown by occupation, become available, the task would be a short one.

It would appear, however, from comparison with countries of similar population and stage of development (for example, Uganda) that Cambodian secondary and higher education is by now becoming fairly well in balance with the demands of an economy which will not provide a large number of posts at the higher levels for some time. In Uganda, population 6.5 million, in 1961 about 1,300 candidates took School Certificate, which 800 passed, in their twelfth year of education. This is a somewhat more advanced stage than the *diplôme d'enseignement supérieur premier cycle* taken at secondary 4 in Cambodia in the tenth year of education; but there were almost 7,000 Cambodians in form 4 in 1962 and 2,160 passes for *D.E.S.P.C.* In Uganda, total enrolment in secondary was around 32,000;[1] in Cambodia, 40,000. In Uganda, 130 students took the Higher School Certificate and GCE 'A' examinations, compared with 233 in the *baccalauréat II* class in Cambodia. Income per head, around £20 in Uganda in 1960, was markedly lower than in Cambodia; the degree of industrialization was similar, though the development of light industry in Kampala would exceed that in Phnom Penh. It is noticeable that Cambodia's numerical advantage at form 4 is almost lost by the stage of university entrance. It may well be that the heavy loss at the *baccalauréat* stage reflects not only the high standards at that stage but somewhat low standards in the first cycle, forms 1-4; this will only be cured by better-qualified teachers. Not all the *lycées* in Cambodia are in fact able to go through to form 7, and many country students have to come to Phnom Penh for their second cycle.

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[1] Includes 25,000 in the seventh and eighth years of education, called 'junior secondary', at the relevant date.

	Uganda[1] *1961*	*Cambodia 1961/62*
Population, 1961/62	6 600 000	5 750 000
Total primary (I-VI Uganda, I-VI Cambodia)	566 000	590 360
Total secondary (Uganda 8 years, Cambodia 7 years)	32 000	41 000
School Certificate, Uganda (year 12)	800	
D.E.S.P.C., Cambodia (year 10)		2 160
Higher School Certificate, Uganda, (year 14)	130	
Baccalauréat II, Cambodia (year 13)		233
Students abroad (bursars, scholars and private students)	1 059	501[2]

Both the similarities and differences in these figures are significant. The Uganda pre-university school career was one year longer. By year 12 in Uganda there were still 1,300 pupils and 800 passes in School Certificate, while in Cambodia in year 12 (*baccalauréat I*) there were 675 pupils. From a similar base of primary education, Uganda is carrying rather more pupils through twelve years of education, but rather less to the point of university entrance. Uganda is also using overseas scholarships to a higher degree. The figures of local enrolment in universities are not comparable, since there are a variety of entry levels in Cambodia not reproduced in Uganda; but, roughly, both countries had about 1,600 students in university-level education at home and abroad, with a higher proportion of degree students from Uganda.

The purpose of this comparison is that a careful look at Uganda's requirements with Professor Harbison[3] suggested: (a) there was still a need to expand secondary education and to carry a higher proportion through to university entrance; (b) there was need to expand post-form 4 on-training, particularly in agriculture, medical services and teacher training, to a less extent in technical training, where quality rather than quantity was required; (c) it was advisable to go only slowly in the expansion of primary education until the urgent needs of higher manpower were met and financed from a limited budget and until a larger corps of better-trained teachers was available. It would appear that these points would apply, and with increased force, to the Cambodian situation, where large numbers of pupils reach the tenth year of education, but barely one-tenth survive to the point of university entrance, for which a high standard is rightly maintained. The suggestions which would emerge from this are as follows:

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1. *Ministry of Education Annual Report for 1961.*
2. *Bulletin de Statistiques Scolaires, 1963.*
3. *High-Level Manpower in East Africa—Preliminary Assessment*, by G. Hunter and Professor F. H. Harbison (consultant), 1962.

1. Assuming that there is some stringency in the budget, to restrain gently the numerical growth of formal primary enrolments, while expending great efforts on adult education of the rural population in agricultural practices. Informal primary education of the youngest children through parents, village self-help and community development may have to continue for some time.
2. To strengthen the quality of the first four years of secondary education, so that more pupils are carried forward to the higher stage and more are available for post-*D.E.S.P.C.* on-training.
3. To concentrate post-*D.E.S.P.C.* training in four sectors: teacher training, agricultural training, medical training, and artisan training (good artisans are more scarce than technicians at present).
4. To control strictly the amount of higher technical education to a level at which employment will be available for the graduates. Cambodia has not a great industrial strength and it will offer only limited entry for some years at this level.
5. To concentrate the dispersed faculties of the university into a single university institution with full-time staff.

These general suggestions require amplification at three points—agriculture, teacher training and medical services.

Agricultural education and training. There is little doubt that the need for agriculturalists and teachers points to the two highest manpower priorities. The development of an efficient full-scale agricultural service involves a three-tier system and research:

I(a). University-graduate agricultural officers as the controllers and policy-makers of the field service;
I(b). Post-graduate agricultural research officers to initiate and sustain research on new crops and methods, animal husbandry, etc.;
II. Diploma-level field staff, in fairly large numbers, for the day-to-day direction and supervision of agricultural advance;
III. *Agents de culture*, in a proportion of at least 5:1 to the II level, as the infantry of the agricultural field service.

A clear distinction is needed between I(a) and I(b). Most of the research staff can enter with an ordinary science degree (botany, zoology, chemistry, etc.), followed by applied post-graduate work in the agricultural field. They need not have a B.Sc. (Agriculture) as their first degree. On the other hand, the small corps of agricultural officers I are the commanders of the field service and must be practical administrators with a good knowledge of real conditions and difficulties in the field. The Division II (diploma) force also need practical training, but with a better theoretical background than the *Agents de culture*. A rough proportion for Cambodia might be, for the next decade: Division I(a) field,[1] 75; Division I(b) research and support, 200;

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[1] Including animal husbandry and fisheries, but not veterinary.

Division II, 350-400;[1] Division III, 1,500-1,000.[1] There are two implications for the School of Agriculture and the University. The first is to maintain a distinction between the diploma level (three years post-*baccalauréat I*?) and the full degree level (five years post-*baccalauréat I* or four years post-*baccalauréat II*) with some post-graduate work or overseas training. The second is to build up the Science Faculty on the biological side with particular emphasis on agricultural sciences, and perhaps less on the medical and physics side which are appropriate to the Faculties of Medicine and the College of Technology.

It is surely justifiable to suggest that Cambodia, a predominantly rural country, should produce at least 20 university graduates in agricultural sciences per annum, and that 5 out of these should be field officers. At diploma level an annual output of 50 should be ample.

To achieve the much-needed agricultural revolution a great and concentrated effort is needed in agricultural training and, moreover, in the staff of the Office Royal de Cooperation as the crop-purchasing and marketing agency, and in community development and *éducation de base*. It is vital that these agencies should not compete or conflict. 'Agriculture' is used in the broadest sense, to include animal husbandry and, more important still, silviculture. The forests of Cambodia are a great natural resource, both for sawn timber and plywood and for maintaining and protecting soils and water supply.

Graduate teachers. While the training of primary and junior secondary teachers is well in hand, the supply of teachers for the higher levels of secondary education is still lacking. Here again, at university level, the relation between the Institut National Pédagogique and the Faculté des Lettres will need clarification. Teachers with about three years post-*baccalauréat II* education are badly needed, whether this consists of a first degree from the faculty followed by some training at the institute, or of a course wholly within the institute. The expansion and improvement of the educational system at higher levels depends upon this foundation of graduate teachers.

Health services. Cambodia is much handicapped in medical work by the difficulty of communications. There is undoubtedly malnutrition in the mountainous areas which are sometimes impossible of access, and which have also a special problem of malaria, since the vector mosquito does not enter houses and cannot therefore be dealt with by house-spraying. Moreover, the extremely simple conditions of rural areas make it difficult to persuade fully trained doctors to serve in them. Cambodia has rightly concentrated on training *officiers de santé* in a four-year course in the Faculty of Medicine. As in many similar countries, these officers can cover a great deal of simple medical treatment and are more willing to serve 'in the bush'.

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[1] Some Division II and Division III are needed as assistants at research stations.

The medical staff is small. In 1962 it included about 35 doctors (of whom 23 Cambodian who received their final training in France), 120-130 *officiers de santé*, 6 dentists, 6 pharmacists, 162 midwives, 1,257 nurses and 297 assistant nurses, and 416 rural midwives. Hospital beds numbered 4,300; infirmaries, 157.

As in other developing countries, the proposals for advance are based on the establishment of rural health centres; but this programme is proceeding only slowly, for lack of staff and equipment and transport. If the *officiers de santé* are counted as doctors, the total is 160 to 5.75 million population, i.e., 1 : 36,000. However, an output of 20 doctors and 40 *officiers de santé* per annum would bring this total up to a stock of 450 in five years, i.e., 1 : 15,500, which is a rather better figure, though still very low.[1]

The difficulty lies in a certain sluggishness in the recruitment to the *officier de santé* course and a deplorably high failure rate. The apparently modest target of 20 doctors and 40 *officiers* p.a. may still be beyond the strength of the training system. But if Cambodia is to have a medical service which is even passable by the standards which will obtain in 1970, heroic efforts will have to be made to improve recruitment to the courses and (even more important) to cut down failure rates. It should be possible to raise the output of doctors to at least 30 per annum by 1970, and that of *officiers de santé* to 60 or 70. Even with this increase, it would barely be possible to reach a combined force of 750 by 1972,[2] which would almost achieve a ratio of 1 : 10,000. At least this target should be set.

These figures imply not only an increased entrance of trainees in the Faculty of Medicine but a large increase in training of post-*D.E.S.P.C.* auxiliary staff—nurses, sanitarians, midwives and technicians of all types. It is for this reason, and for the supply of agricultural extension workers, that so much emphasis has been placed on training for the students who complete the first cycle of secondary education.

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[1] 1968 population not far short of 7 million.

[2] 1970 population estimated at 7.3 million.

Republic of Viet-Nam

INTRODUCTORY NOTE

The war and the extent of United States aid to South Viet-Nam make it impossible to draw up any realistic quantitative estimates of manpower requirements. The war has obvious effects—large numbers of men with qualifications are serving in the armed forces, and neither their number nor the time of their possible release can be stated. United States aid presents a more subtle problem. Although the budget can be divided into a civil and a security sector, it is extremely hard to know whether the level of overheads (education, health and similar services) could in fact be maintained under 'normal' conditions—that is, if the war stopped and South Viet-Nam received only the amount of foreign assistance normally available to a developing country. Some figures demonstrate relative orders of magnitude (1962, in million piastres):

Revenue		
Civil budget		11 969
Deficit	14 089	
Less United States aid		9 620
Net deficit		4 469
TOTAL		26 058

Expenditure	
Civil budget	8 208
Security	14 050
Development	1 500
Special (strategic hamlets, etc.)	2 300
TOTAL	26 058

While, in theory, the end of the war and reduction of aid should leave the civil budget balanced, it is hard to believe that the whole level of expenditure and social provision has not been somewhat inflated, i.e., that the Republic is not carrying a superstructure of education and some other services out of balance with the development of the domestic productive resources. To make manpower projections on the basis of indefinitely continuing warfare and aid would be pessimistic; to plan for peace and reconstruction involves altogether too many unknown quantities. For this reason, although a 'manpower survey', as suggested by the Unesco Mission on Educational Investment, would be valuable in ascertaining the existing situation more accurately (if the army would provide detailed lists of highly qualified conscripts, which is doubtful), I doubt if any worth-while future projections could be made. I have tried in this report to suggest certain targets and to note certain imbalances; but these are targets rather than forward estimates, and of a fairly general kind.

South Viet-Nam has a considerable stock of extremely highly educated citizens, and an additional possible reserve of Vietnamese with professional skills now working or studying in France—estimates are as high as 3,000-5,000 overseas. It is equipped with a range of high-quality institutions: the Institute of Administration, National Industrial Development Centre, the University of Saigon, when it is rehoused on its new site, the Technical College at Phu-Tho. It has a considerable volume of secondary education, rapidly expanding, and a vigorous and intelligent population. In fact, the human and institutional 'infrastructure' exists, though over-concentrated, in Saigon. The difficulty lies in underdevelopment of the country's main resources—agriculture and the rural population, at present so hard of access. There is therefore some danger of creating in Saigon (as the Unesco Mission observed) a closed circle of education supplying a swollen government structure, without the development of economic resources to pay for both, and without the growth of employment opportunities to absorb the growing numbers of graduates.

THE ECONOMY

Population

	1961	*1962*	*1965*	*1970*
United Nations statistics[1]	14 520 000	—	15 728 000	17 502 000
Institut de la Statistique	14 400 000	14 800 000	16 000 000	18 200 000

The figure of 14.8 million for 1962 will be used here, with 16 million for 1965 and 17.8 million for 1970.

Economy

Gross national product for 1962 was estimated at 82,000 million piastres.[2]

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[1] Proportional to projected growth of North and South Viet-Nam together.

[2] Unesco Mission on Educational Investment.

If this is translated into pounds sterling at 200 piastres (the tourist rate), the product *per capita* is £28; if at 168 piastres (the official rate) it is £33.

The budget has shown a continuous deficit, largely though not wholly covered by United States aid. Total United States aid in 1962 was estimated at $287 million (military, $144 million; civil, $143 million). The commercial trade balance for 1961 was estimated as a deficit of U.S. $201 million against United States aid of $161 million.[1] The value of the two principal exports, rice and rubber, was estimated by USOM to have fallen as follows (in U.S.$ million):

	1959	*1960*	*1961*	*1962*
Rice	23	27	14	9
Rubber	47	48	44	38
	70	75	58	47

This fall in rice production is, of course, partly due to the war, but partly to the catastrophic floods of 1961. The figures for 1963 were far more encouraging, reaching nearly 300,000 tons, against 83,865 in 1962. The general progress of the economy in 1961 was less disappointing. Rubber (total production 79,143 tons in 1961, against 76,611 in 1960), cattle and sheep, timber, mining, tobacco—all showed significant increases in output.[2] Moreover, the estimated gross national product of 82 milliards in 1962 compares with a similar estimate of 68 milliards in 1956, an increase of over 20 per cent in six years.

While, in terms of occupation, the Republic is an agricultural economy (about 22 per cent of population is urban, of which two-thirds is in Saigon-Cholon), the proportion of GNP arising from agriculture is remarkably small. The 1956 analysis showed the following percentages: agriculture 26, industry and mines 14, commerce 30, administration 14, totalling 84 of GNP. The Unesco Mission remarked on the excessive development of the tertiary sector.

A considerable effort has been put into plans for industrialization. Major plans, or achievements, include a coal-chemical complex at An Hoa and Nong-Son, based on French and West German credits; a barrage and hydro-electric plant at Da-Ninh and two more hydro-electric schemes planned; an oil refinery at Nhatrong of 800,000 tons capacity; a growth in the already strong textile industry to 110,000 spindles; the expansion of cement manufacture to 300,000 tons (Ha-Tien) plus 20,000 tons (An-Tho); a sugar mill at Kiep Hoa with a capacity of 20,000 tons, and a second at Quang-Ngo now projected (15,000 tons); a very large fertilizer industry (1 urea and sulphate; 1 phosphate) with a capacity of 1 million tons; 2 tyre factories; a pharmaceutical industry and a number of smaller enterprises and groups (tobacco, glass bottles, paper, fibre, soft drinks, etc.).

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[1] *USOM Statistical Bulletin.*

[2] *Evolution de l'Economie au Vietnam 1961* (monthly statistical bulletin, supplement, 1962).

Some detailed figures of enterprises and employment in Saigon only have been ascertained. In 1961, out of 44,000 industrial and commercial enterprises, employing 255,230 workers, 94 per cent employed fewer than 10 workers; 3.8 per cent between 10 and 20; 2.2 per cent 20 or over. The 1960 Census of Establishments (Saigon only) showed very similar percentages, and gave a total of 30,115 workers employed in 2,042 manufacturing industries; the census also provided the following percentages of total value for the output of each industry: tobacco 21.9, alcoholic drinks 15.0, electricity 12.3, non-alcoholic drinks 5.7, tissues other than cotton 4.7, cotton tissues 4.5, clothing and shoes 3.4, pharmaceuticals 2.6, total 70.1 per cent. It must be remarked that until recently there was virtually no engineering industry in South Viet-Nam and that a high proportion of professional and technical staff for the major new industries now built or building are foreign—from Taiwan in many cases, or brought in by French and other major contractors.

At this stage of the Republic's development a very large gap has thus opened up between the large modern enterprises, launched with foreign capital and technicians though part-owned by the Vietnamese State, and any substantial development of small and modern industries based on Vietnamese enterprise, management and technical skill. This is always liable to happen in the early stages of development; but it has two dangers. First, it may re-emphasize the contrast between Saigon and the rest of the country. Second, these large capital-intensive enterprises are not in total heavy employers of labour. Even if there is no demobilization—and that would cause an unemployment crisis of frightening dimensions—the Republic is running headlong into the familiar crisis of an 'education explosion' unmatched by comparable growth in non-agricultural employment. The earliest opportunity to develop more dispersed, smaller, agriculturally-based industries and services will have to be grasped.

THE EDUCATIONAL SYSTEM

General

TABLE 37. Primary education (I-V, 1962/63)

Sector	Total enrolled	Standard I	Standard V[1]
Public	1 174 020	364 475	140 338
Private, etc.	276 659	116 170	28 610
TOTAL	1 450 679	480 645	168 948

1. Includes *cours des certifiés.*

TABLE 38. Secondary education (7-1, 1962/63)

Sector	Total enrolled	Form 7	Form 4	Form 2	Form 1
Public	98 749	22 071	13 340	10 260	5 759
Private, etc.	163 461	51 110	30 079	13 718	2 559
TOTAL	262 210	73 181	43 419	23 978	8 318

The heavy contribution of private and semi-private education in the first cycle (7-4) of secondary education is remarkable. In terms of general balance, the first cycle of secondary education had a total enrolment of 209,229; the second cycle (forms 3, 2 and 1) of 52,981. The first part of the *baccalauréat* is taken in form 2 and the second part in form 1. Roughly 100,000 pupils passed out of the primary system in 1960/61; 21,900 passed the *brevet d'enseignement secondaire* at form 4; 7,527 the first *baccalauréat;* 4,082 the second *baccalauréat* (5,517 in 1962/63).

Secondary technical

Enrolments, 1962/63, and lengths of courses are as follows:[1] Ecole d'Agriculture de Hué, 66 (3 years); Ecole d'Agriculture de Can-Tho, 82 (3 years); Ecole Nationale de Navigation, 58 (2 years); Ecole Nationale de Commerce, 161 (3 years); Ecole des Métiers, 216 (3 years); Lycée Technique Cao-Thang, 1,453 (7 years); Ecole des Arts Appliqués, 338 (4 years); seven *collèges techniques*, 1,880 (4 years); total 4,247.

Higher technical

The total enrolment, 1962/63, was 1,150 (*ingénieur* 752, *agent technique* 398), or 872 if the School of Administration is omitted.[1] These figures are made up as follows:

Institut National d'Administration: 278.
Ecole Supérieure Agronomique, Forestière et Vétérinaire: *ingénieur* 176; *agent technique* 188.
Centre National Technique de Phu-Tho:
  Travaux publics: *ingénieur* 97; *agent technique* 121.
  Chimie: *ingénieur* 55.
  Electricité: *ingénieur* 79; *agent technique* 89.
  Arts industriels: *ingénieur* 67.

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[1] Unesco Mission.

There is also a school training merchant marine officers and technicians.

Entry into the Higher School of Agriculture is by examination at the level of the complete *baccalauréat*. The course is of one preparatory year in the Faculty of Science and three years in the school. At Phu-Tho the technician course is of three years after form 4 and the engineers' course four years after the second *baccalauréat*.

University level

South Viet-Nam has three universities (Saigon, Hué and Dalat). Enrolments are shown in Table 39. There is, however, a difficulty in that an unknown number of applicants enrol in two or more universities (perhaps 10-20 per cent) and the registration which is not taken up may still be counted.

TABLE 39. University enrolments

Faculty	Saigon[1] (1962-63)	Hué (1961-62)	Dalat (1961-62)
Law	2 995	247	194
Médecine	1 233	96	—
Science	3 383	859	92
Lettres	3 675	788	—
Education	684	242	177
Pharmacie	1 282	—	—
Architecture	447	—	—
Sinologie	—	159	—
	13 699	2 391	463
GRAND TOTAL		16 553	

1. In 1961/62 Saigon had a total of 12,897 enrolments.

After an allowance has been made for double registration, which might reduce the total to fewer than 15,000 these enrolments still do not produce the expected number of successful graduations. Huge numbers of students enrol in certain faculties (for example, the Faculty of Science in Saigon) who cannot effectively follow the course, and the great majority of these fall out at the examination at the end of the first year. Moreover, by no means all the students are regular followers of the whole course. The Unesco Mission reckoned that, in Saigon, only 2,690 students in science out of 3,383 enrolled were *assidus*, and only 1,900 out of nearly 4,000 in *lettres*.

The degrees actually given (arising, of course, from earlier enrolments) are somewhat difficult to ascertain from the statistics published, but some of the more important are given in Table 40.

TABLE 40. Graduations from certain faculties

Faculty	Saigon		Hué, 1962	Dalat, 1962
	1962	1961		
Science	37	21	5	3
Pédagogie	168	177[1]	60	—
Lettres	57	36	6	6
Architecture and Town Planning	10	10[2]	—	—
Law	—	90	12	—
Médecine	—	59	—	—
Pharmacie	—	20	—	—
Dentistry	—	15	—	—
	272	428	83	9

1. Includes graduates of the one-year 'accelerated' course.
2. Includes some from the three-year course, as well as from the full five-year course.

From these figures the output of the university appears absurdly small. But too much emphasis must not be placed upon the culminating examination, save in those fields where failure results in inability to enter the profession (medicine is the most important). If the figures of those who reach the final year of a course, or of those issued with the *certificat* are taken, the result is a good deal higher. These students have had a long period of education and are well fitted for all but the most highly technical or professional jobs in the economy. Thus the *Annuaire Statistique* for 1960/61 gives, for all three universities, 392 *certificats de licence*[1] from the Faculty of Science and 756 from the Faculté des Lettres.

SPECIAL MANPOWER REQUIREMENTS

Agriculture

Until greater areas of South Viet-Nam are freed from civil war, it is useless to expect much headway towards a technical revolution in agriculture. But plans must be laid on the assumption that peace and security will be restored. Meanwhile, there is an opportunity to build up a corps of trained agricultural field staff ready for the time of fresh advance—the present output is certainly inadequate.

At the university level, the Ecole Supérieure Agronomique, Forestière et Vétérinaire, which was moved to Saigon from Blao in 1961, is in great difficulties, in borrowed classrooms and without proper farm and other practical facilities. In 1962 the enrolment was 176 on the course for *ingénieurs* and 188 for *agents techniques*. The *ingénieur* course is one of four years, entered after the second *baccalauréat*. At the secondary level, 65 and 80 students were enrolled in the agricultural schools of Hué and Can-Tho in 1963/64. There is no shortage of applicants for places: there were 1,100 applicants for 100 places in the Ecole d'Agriculture de Bao-Loc (when a secondary college) and 1,000 for 50 places at Can-Tho.

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[1] 4 *certificats* are needed for the *licence* in science, 4 or 5 in *lettres*.

The numbers employed in 1963 were stated by the Government to be:

	Agriculture	*Silviculture*	*Elevage*	*Total*
Ingénieur	67	33	34	134
Contrôleurs	86	68	43	197
Agents, or *vaccinateurs*	189	153	111	453

The Unesco Mission suggested that, in twenty years, the need would be for one *ingénieur agricole* for 800 hectares of cultivated land = 3,700; one *ingénieur silvicole* for 20,000 hectares of forest = 2,000; one *ingénieur vétérinaire* for 5,000 animals = 400; total 6,100. On the basis suggested of one *ingénieur* to five *techniciens* or *agents*, the need would be for 30,500 at that level with outputs of 200 *ingénieurs*, 400 *techniciens* and 600 *agents* per annum, and corresponding student populations in training.

With great respect, I suggest that these figures are unnecessarily high for practical consideration at the present time. What the situation may be in twenty years is beyond any rational calculation, and it would be time enough to make decisions on the volume of training about eight years before the trained men are required, allowing two years to create, if necessary, additional institutions and six years to build up output. There is no likelihood whatever of a shortage of candidates at the appropriate level. As a more immediate, ten-year target, it would seem reasonable to suggest that South Viet-Nam might need a force about as large as the targets set for Malaya, namely about 350-400 graduates (*ingénieurs*), 750-800 diploma-level (*techniciens*) and perhaps 3,000 post-secondary form 4 field men. Allowing, however, for more pioneering work, more research, and a thicker covering of the ground, these figures might be increased to 500 graduates, 1,200 diploma-level and 4,000 field men. This would involve outputs of 20, 50 and 160 respectively to maintain the force in being, and higher outputs to reach the level—say, 40, 100, 300. Ten years of production at these rates would produce a very substantial field force, higher per head of population than any country with similar national income. Although the salary and training cost of such a field advisory service is not charged against agricultural prices, it is an overhead in the national economy which would add quite considerably to the cost of crops grown, viz. 500 *ingénieurs* at £1,200 p.a. salary: £600,000; 1,200 diploma-level at £900 p.a. salary: £1,080,000; 4,000 field men at £450 p.a. salary: £1,800,000; total £3,480,000 p.a. Even if all these salaries were to be reduced, the bill is still formidable.

Industry

There is clearly a need for more trained men at engineer, technician and artisan level in the large new industries, since these have had to be supplied by overseas contractors. But it would, in my view, be a grave mistake to assume that this demand will grow fast once the needs of a score of major modern enterprises have been met. Here the experience of Burma, also beset by security problems, may be relevant. An output of 100 engineers per year quickly outran the employment opportunities, despite a programme of industrialization which achieved limited success. Indeed, it might well be that if, today [in 1964], 250 Vietnamese trained engineers, 1,000 technicians and 3,000 artisans could be materialized out of thin air, most of the existing vacancies would be filled. It is well within the capacity of the existing educational system to produce such numbers within three or four years at graduate and technician level as raw material; it is more doubtful if the required number of artisans (*ouvriers qualifiés*) could be produced.

The real difficulty lies not with the size of theoretical education but with the facilities for practical training. The urgency lies in developing apprenticeship, in-service training, evening-class work and all the means of turning paper qualifications into practical ability. This applies in two ways. First, the gaining of practical technical knowledge in the real conditions of industrial work. Second, in gaining skills of management, including the skills of handling finance and personnel in which the engineer and technician are so often deficient. The establishment of the National Industrial Development Centre in Saigon is a valuable step. But it is necessary for government to insist that the industrial employer plays his full part in practical training, and to reject the demands that institutions of technical education should turn out students already specialized in particular industrial applications of general technical knowledge. Such a demand is usually mistaken, since industry advances and changes far faster than the staff and equipment of formal institutions can be altered, and because every enterprise develops its own specialized techniques which the incomer must learn.

There does, however, appear to be a shortage of basic training at the artisan level, and this might well be investigated. Since the Government is part-owner of so much of the modern enterprise, it might be possible to organize workshop training within industrial installations which would supply a surplus of artisans available for outside employment.

Medical services

There is considerable doubt as to the number of doctors actually practising in South Viet-Nam. The *United Nations Statistical Year Book* quotes 489 for 1960. With an output of 120 in 1960/61 and 1961/62, this would give about 600. Local information in February 1963 suggested 700 doctors in practice, of whom nearly half were serving with the armed forces. The proportion is 1 : 21,000 population if the 700 figure is accepted. In any case, it is too low; but the output from Saigon, now attaining 60 or more per annum, added to an output from Hué, where the Medical School was started only in 1961/62, will already be improving the situation. It would not be unreasonable to foresee an output of 100 doctors per annum in the near future, rising to 150 per annum if the Saigon Faculty is rehoused and improved in the proposed School of Medicine on the new campus at Thu-Duc. Such an output would build up roughly as follows:

Stock 1962	*Output to 1970*	*Wastage*[1]	*Stock 1970*	*Stock 1975*[2]
(700)	800	220	1 280	1 800

These figures would give doctor/population proportions of 1 : 14,000 in 1970 (population 17.8 million) and 1 : 10,500 in 1975 (population 19 million). This is probably an unacceptably slow rate of improvement. To improve it further would probably not immediately entail a third medical school but a more efficient use of the existing schools. If by 1970 the output from Saigon could be raised to 150 per annum, and from Hué to 100, giving 250 p.a., the 1975 stock would become 2,300 and the proportion 1 : 8,000. Annual output of 250 doctors would eventually maintain a force of 6,250 in the field. There is an ample supply of candidates for training in the technician and auxiliary posts for the Medical Service.

The outputs from training in 1961 were: 73 *techniciens de la santé*, 87 *techniciens hospitaliers*, 61 *sages-femmes d'Etat*, 95 *aide-infirmiers*, 21 *aide-laboratoires* and 27 *préparateurs de pharmacie*. There were 139 district infirmaries, 190 maternity centres, 90 dispensaries and 3,231 village first-aid centres. The distribution of these services is clearly inadequate at present, but expansion may have to await more peaceful conditions.

The problem, indeed, is not really difficult in terms of the supply of personnel, though progress is always slow where training is so lengthy. It is in the opportunity to organize a dispersed health service which reaches down to the villages. Once the security problem is solved, the mobilization and deployment of medical personnel into rural areas will become possible and necessary.

Teacher training

The total number of teachers in 1962[3] was as shown in Table 41.

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[1] Four per cent of 700 over eight years, 224.

[2] Output 750. Wastage 3 ½ per cent (since the stock will be young and indigenous).

[3] *Situation et Progrès de l'Enseignement*, etc., 1962.

TABLE 41. Distribution of teachers, 1962

Sector	Primary[1]	Secondary[2]		
		First cycle	Second cycle	Total
Public	19 362[3]	1 656	616	2 272
Private	6 358	3 533	1 221	4 754
	25 720	5 189	1 837	7 026

[1] 1,450,679 pupils.
[2] 262,210 pupils.
[3] Including approximately 7,000 *titulaires* and 12,000 *non-titulaires*.

These figures give a teacher/pupil ratio of 1 : 56 in primary and 1 : 36 in secondary. There was felt to be a fairly acute shortage of good secondary teachers. Moreover, some 400 or more were French, in addition to the large numbers of French university teachers.

Training of primary teachers is done in five colleges. Three recruit from *baccalauréat I*, with two years' training; one, at Tan-An, has recruited from form 4 (*brevet*), but may raise this level; it gives a one-year course for rural teachers closely integrated with schemes for community development and *éducation de base*. The fifth, at Ban-Methuot, is training teachers for Montagnards in a four-year post-primary course. Total output in 1962 was around 1,500. The aim is to increase this to 2,500 per annum, a number which would eventually maintain a field force of over 60,000 teachers, which should be ample.

For the secondary level, the Faculté de Pédagogie, to be installed in the new university site at Thu-Duc, takes entrants after *baccalauréat II*, on a three-year course, now to be lengthened to four years. Enrolment in 1962/63 was just under 700; output about 170 per annum. There is much competition for places. The Faculty at Hué is on the same model. In 1962 it accepted 150 candidates out of 730. It will presumably build up to an enrolment of the same size as Saigon, with an output of 170 or so. Thus an output of 330-350 is probable within a short time, and it is intended to raise this to 375. This would maintain, in due course, about 9,500 teachers in the field, enough to cover 285,000 pupils at a ratio of 1 : 30.

This output may be barely sufficient; but there are at least 100 training in America, and rather more in France, and it is possible that the private and mission schools will continue to supply expatriate teachers as long as they are urgently needed. Further, some additions will come from Dalat University. A figure of 400 per annum, supporting a force of 10,000, should certainly be aimed at as a total from all sources.

A teacher-training college for teachers in technical institutions, partly done at Phu-Tho, is certainly essential. If the Unesco Mission recommendations to enlarge the proportion of secondary technical schools were accepted, this provision would require urgent attention.

It is assumed that university teachers would be drawn from Vietnamese now studying abroad.

EDUCATION AND MANPOWER POLICY

While it is not possible to prove this statistically, it appears highly probable that South Viet-Nam is moving rapidly to a situation where the secondary and higher education system, constantly expanding under the pressure of popular demand, will outrun the opportunities of employment and the strength of the national budget. It would have done so already but for the 'employment' offered by the armed forces. Such a situation presents great difficulties in education, because the scarcity of jobs puts a constantly higher premium on academic qualifications and reinforces the pressure on already overcrowded universities. Moreover, it leads to greater pressure for higher, post-graduate degrees and overseas qualifications, neither of which correspond with the real needs of society at the time.

It would follow from this that expansion of higher education should be pursued only with great caution, save in those fields where the Government itself can guarantee employment on urgent national work—in medicine, agriculture and school-teaching in particular.

There is a financial aspect to this situation. Massive foreign aid can easily mask an imbalance between social service expenditure and real growth in the productive economy. The industrial sector is indeed growing where major foreign enterprise is concerned. But the real source of greater wealth and greater employment opportunity must be in the agricultural economy, and in smaller enterprises related to agricultural output. Here United States aid, under Public Law 480, may indirectly be having a depressing effect on agricultural initiative and incentives. It prevents the rise in prices which would otherwise have tempted the farmer to greater effort; it blunts the sharpness of need, which might otherwise have resulted in greater governmental effort and earlier training of an adequate agricultural field service; and it masks the urgency of developing new crops (for example, cotton and tobacco) by massive imports at low prices.

It is certain that secondary education must expand. There is therefore the more point in the Unesco Mission's recommendation that a secondary course should more often be regarded as terminal (within the education system itself) and not merely as a prelude to the university. While some increase in the proportion of technical and vocational schools to the general academic schools is clearly desirable, experience elsewhere would imply great caution in emphasizing the technical element too strongly. What is needed is post-school technical and vocational training, in realistic conditions: and the best basis for that is an education strong in basic disciplines, conscious of the real environment, but not attempting a premature application or training. It may well be desirable to emphasize secondary expansion in rural areas, with the school retaining a strong interest in the problems of rural development.

These suggestions are based clearly on manpower considerations. First, the demand for technicians as such is likely to grow slowly, so that massive specialized training in school might result in great frustration. Second, that employment on the scale which will be required by eager school-leavers can ultimately be developed only as the outcome of increased economic activity and purchasing power among the majority of the population—that is, the rural population—and not from the small urban sector which is already becoming overcrowded with the products of secondary and higher education.

At the university level two major problems may be mentioned. First, it is clearly important to relieve the teaching staff of the massive influx of poorly qualified first-year students. In 1963 the laboratories in the Science Faculty in Saigon were on two-shift working to deal with these excessive numbers, with inevitable ill-effects on the teaching staff and in retarding the work of abler students. In Saigon itself some relief may be gained if the university moves to its new site, leaving some space available in Saigon for 'junior college', external, or diploma-level work. But this is a fortuitous opportunity. In principle, the only ways both of relieving university pressure and of creating a stronger manpower resource at diploma-level may well be to create rural colleges, of sub-university standard, giving somewhat more 'modern' and applied courses (accountancy, commerce, survey, irrigation and simple agricultural engineering, basic mathematics, physics and chemistry with a bias towards processing and rural industry, etc.). The second alleviation is in the expansion, not of colleges, but of post-secondary training for specific sub-professional occupations.

The second problem is that of language. This will no doubt be more thoroughly examined in other sections of the Unesco/IAU Survey. But the quality and efficiency of the graduate from the education system, whether from secondary or higher studies, is a vital 'manpower' subject. The present hesitation between English, French and Vietnamese, with the resulting trouble over comprehension, textbooks and the training or recruitment of teachers, is a heavy drag on the student and greatly impairs the effectiveness of the educational system and the real return on national financial resources poured into it.

The Philippines

GENERAL

The economy and society of the Philippines are in many ways quite unlike those of the other South-East Asian countries under review, both in content and, more especially, in atmosphere and attitudes. The economy, in fact if not always in appearance, is one of capitalist enterprise, both in industry and in large agricultural plantations and estates (sugar, coconut, abaca, etc.). Despite a large government superstructure, government participation in industry, a complex planning mechanism with a host of agencies, heavy expenditure on education and relief, it is neither a planned nor a socialist atmosphere; it has much more in common with pre-war America, and this greatly affects the position of education and the supply of manpower.

A second distinguishing feature is the huge growth of private commercial enterprise in education at secondary and collegiate level, which has brought enrolment in colleges and universities, all but two private, to a figure nearing 1 per cent of population (higher than Great Britain) and has made investment in some of these colleges a high-yielding speculation with returns of 25-30 per cent on capital in many cases.

On the other hand, the hard facts of the economic and social situation have much in common with the rest of South-East Asia. Despite the wealth of Manila and of the great landlords and agricultural industrialists, the Philippines is, globally, a poor country with an income per head barely reaching £50—half that of Malaysia. This is due to the extremely large rural population still living, in terms of cash income, at the poverty line, and largely unaffected by the prosperity of the small top sector in Manila. Income per head is constantly threatened by the growth of a large population—nearly 30 million and increasing at about 1 million per annum—and a high proportion of unemployed human resources (probably 1.5 million unemployed and twice or three times that number underemployed). Thus the problems of effecting an agricultural revolution, of decentralizing economic growth, of ensuring the spread of social services and a share of high-level manpower to rural areas, and of finding employment for a growing multitude of citizens who have been educated out of rural pursuits—problems encountered in all other countries in the area of this report—are as real and pressing in the Philippines as anywhere.

Taken as a whole, this type of economy and society presents a wholly different problem for manpower policy. First, by free enterprise the nation has already produced a large stock of 'high-level' manpower, of extremely varied quality from very high to very low, far in excess of the employment opportunities for high school and college graduates, if these were to confine themselves to jobs which in other South-East Asian countries are considered to require secondary or college qualifications. Here, as in the rest of Philippine society, there is competition, and the law graduate who cannot get into the profession must drive a taxi or start a business if he can. There is no likelihood of the economy catching up with this situation in the near future, and therefore no question of planning how to meet minimum requirements in terms of numbers; it is the question of quality which will be the issue here. Further, while commercial enterprise in education remains free, there is nothing to prevent the establishment of new institutions and yet higher outputs, if consumer demand remains high and profitable.

In a word, the whole approach of 'manpower planning' by numerical estimates of narrowly defined 'requirements' is not here applicable, because the outputs are not planned but responsive to commercial supply and demand factors. An approach by market research methods, which would seek to estimate the future attractiveness of college education as a consumer good, in competition with other goods, and the amount of private savings available among parents to invest in it, would be a more appropriate tool.

However, taking as given the social and political philosophy governing society, as this report must do, whether for Burma or the Philippines (to name an antithesis), there remain problems of quality, of distribution, and of the investment of public funds, which are still 'manpower' issues and which can affect the success of society within its chosen philosophy of social action.

In terms of quality, existing plans envisage the creation of a heavy industry based on iron and steel; this alone, apart from a chemical industry and the existing nuclear reactor, requires an output of engineers and chemists qualified to full international standards. Without a certain proportion of highly trained manpower, within the large output from college, the economic progress of the Philippines can be gravely delayed. One legitimate question is to ask how large this proportion must be, and how it is to be created.

In terms of distribution, massive agricultural advance cannot be achieved without a considerable force of well-trained practical agriculturalists widely spread throughout the rural areas. Again, even on economic grounds, the heavy drain on health and efficiency caused by common and preventable disease (internal parasites, tuberculosis, etc.) cannot be cured without a widely distributed medical service, which is at present lacking. Thirdly, a considerable waste of national resources takes place as qualified Filipino doctors, engineers and others emigrate to America and elsewhere in search of employment and higher standards of living.

Finally, in terms of investment of limited public funds, there is the question of choosing between expansion or improvement, between primary, secondary and collegiate, between science and arts; and manpower considerations must enter partially into these choices, although political and purely educational factors will no doubt be more important in practice.

This report, after setting out very briefly the bare statistics, will therefore concentrate on certain key areas where high quality is needed; on questions of distribution, and on certain aspects of investment and policy which are within government control.

THE ECONOMY

The population of the Philippines, according to provisional results of the 1960 Census, was put at 27,455,799. The United Nations projections used in this study suggest the following growth: 27,345,000 in 1960, (29 million plus in 1962), 32,422,000 in 1965, 38,957,000 in 1970 and 47,009,000 in 1975.

Figures for gross national product were not finally available for 1962, but stood at 13,123 million pesos at 1961 market prices,[1] giving a *per capita* figure, on 28.5 million population, of £46. Economic growth was rapid in the early 1950's (over 6 per cent) but appears to have fallen off to about 2.6 per cent in 1960,[2] less than population growth. It had probably recovered by 1962/63 to a figure of 4-5 per cent, i.e., 1 ½ per cent above the 3 ¼ per cent population growth. The index of industrial production (1955 = 100) rose satisfactorily to 160.5 (manufactures) for 1961 and 169.6 for the first quarter of 1962. Balance of payments, particularly since the Cuban crisis and the increase of exports, is satisfactory. Indeed, since the decontrol of the peso, capital seems to have moved into the agricultural export industries and away from the 'new' industries which flourished, if somewhat precariously, behind the tariffs and exchange control of 1961. The whole economic atmosphere is vigorous and thrusting, whatever its short-term difficulties or mistakes.

On the industrial side, a significant effort is planned to develop heavy industry. Up till now Philippine ore has been exported, largely to Japan, and re-imported for final use or for tinning. There are now, however, several major plans for integrated iron and steel plants. One is at Santa Ines, Rizal Province, with West German (Fried. Krupp Industriebau) and Philippine Government interest. One is the government-owned National Steel and Shipyards Corporation project at Iligan City, Lanao Province. The third is also on Mindanao, proposing to exploit the laterite ore deposits in Surigao, and there is also in Surigao (under private enterprise) the Black Mountain iron mine. If, as seems probable, at least two of the first three main projects come into operation within the decade, the total production would rise to about 800,000 tons of ore annually. Other growing industries include textiles, oil refining, logging, cement, car assembly (eight different companies), fertilizer (Esso), food milling and processing, sugar (three refineries), brewing and bottling, and tin making. Electric power, though at present adequate, is not as plentiful as the hydroelectric potential of the Philippines would suggest, and there is some anxiety that it may barely keep pace with demand for the next few years. The Angat and Maria Christina (Iligan) schemes, if completed quickly, would go far to improve the prospects.

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[1] *Philippine Economic Journal,* Vol. I, No. 2, 1962.

[2] G. Y. Itchon, *Philippine Economic Journal,* Vol. I, No. 1, 1962.

It is surprising that, despite the high profits in sugar and coconut, no greater industrial investment is taking place. In fact, money appears to be going into short-term high-yield financing companies—for example, for financing imports of cars, refrigerators, etc.—property speculation and even investment in the high-yielding stock of private universities and colleges.

In agriculture, the situation has been complicated both by the high American sugar quotas since Cuba, and by the new tenancy legislation, under which land under sugar was excluded from the process of turning tenants into owners by compensation of the landlord through government bonds. Both factors have naturally resulted in increasing sugar acreages at the expense of rice. By 1963/64 the Philippines again had to import over 200,000 tons of rice to avoid acute shortages. It appears to be generally agreed that the tenancy system, covering as much as 50 per cent of all landholding, has been at the root of difficulty in improving agricultural productivity, since in many instances neither landlord nor tenant had any real incentive to increase output. Whether the new legislation will in fact prove enforceable and be enforced remains to be seen. At present, conditions have favoured plantation agriculture and, despite the presence of the world-renowned Rice Research Institute, rice yields in the Philippines remain deplorably low.

There is undoubtedly great economic potential in the Philippines: water, fertile soil, the forests and minerals of Mindanao, large well-established export crops. Apart from the improvement of peasant agriculture, the problem of transport, both by road and especially by sea, is felt by many economists to be of high importance. An investment in small piers and jetties and an efficient inter-island fleet would bring to market products from all over the Philippines which at present are wasted or, indeed, never produced.

THE EDUCATIONAL SYSTEM

Elementary

TABLE 42. Enrolments in primary (I-IV) and intermediate (V-VI), 1961/62[1]

Sector	Total enrolled	Class I	Class IV	Class VI
Public	4 226 807	969 052	635 190	367 889
Private	212 049	45 855	28 572	24 783
TOTAL	4 438 856		Primary	3 411 713
			Intermediate	1 027 143

1. Figures for numbers in individual classes are 1960/61; remainder 1961/62.

Secondary

TABLE 43. Enrolments in secondary (1-4), 1960/61

Sector	Total enrolled	Form 1	Form 4
Public	245 912	87 487	41 725
Private	417 584	140 656	73 157
TOTAL	663 496	228 143	114 882

There were stated to have been 69,490 (1961) graduates from private and 48,061 (1960) from public secondary schools. These include graduates from secondary vocational schools.

Vocational

Public vocational secondary schools.[1] Total enrolled: 68,769 (23,636 agricultural, 21,708 trade and industry, 3,425 fisheries).

Public national colleges. Total enrolled: 20,409 (5,549 normal, 4,018 arts and trades, 6,869 commerce, 3,973 Central Luzon Agricultural College).

Private special vocational colleges. Total enrolled: 56,777.[2]

Collegiate, 1961/62

Public. University of the Philippines, 16,679;[3] figures for University of Mindanao not available.

Private. 217,488 in 24 universities; no figures for colleges; total 283,394.[3]

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[1] Bureau of Public Schools, January 1962.

[2] Bureau of Private Schools, 1961/62. (*Note.* The statistics record 56,777 enrolled in special vocational but also 57,366 'students issued with Special Orders for Graduation, 1960/61'—Table IV(a)).

[3] Bureau of Private Schools, 1961/62.

Teachers, 1961/62

	Primary	*Secondary*	*Collegiate*
Public	115 535	24 110	. . .
Private	5 768	13 384	10 000

SOME GENERAL IMPLICATIONS AFFECTING MANPOWER

The Director's Report (Volume I) of this study will no doubt deal in detail with the great educational problems underlying these very large student enrolments. From the manpower point of view, it is enough to mention four points:

1. Philippine students enter the collegiate level after only ten years of education, and often, therefore, at age 15/16.
2. There is enormous overcrowding in many colleges, so that students have difficulty in attending lectures for lack of space.
3. Science teaching in particular lacks good (or sometimes any) laboratories in most secondary schools; good science teachers are extremely scarce.
4. Many students who complete a collegiate education in private colleges are unable to pass the subsequent examination for entry into the practising profession. One examiner in international law observed that in 1962 less than 6 per cent of 4,600 graduates in law were able to obtain the pass mark, though more than 90 of 100 candidates from the University of the Philippines passed.[1] It is clear from comparison of figures of those attending courses in private colleges and universities against the numbers registered as entitled to practise their profession that a huge 'fall-out' takes place:

Students enrolled in certain subjects in private collegiate courses, 1961[2]		*Members registered in corresponding professions, 1961*[3]	
Engineering and technology	41 926	All engineers	14 115
Medicine	10 777	All physicians	17 450
Law	9 183	All lawyers	24 590
Commerce and business administration	82 375	All certified public accountants	7 088
Pharmacy	3 226	All pharmacists	15 186

The second column includes the total profession ever registered, even if not practising. It is clear that the numbers of students are vastly in excess of that needed to maintain professional numbers or to increase them at any rate consistent with the probable expansion of the profession. Many of the students will, of course, enter occupations in their chosen field of study at technician or even lower levels; but they will not have received the type of practical training applicable to those levels: a poor graduate is not a superior technician—in most cases he is not a technician at all. As might be expected, the 1961 inquiry into unemployment among those with high school and higher education revealed a heavy weight of unemployment at both levels, including an estimate of 35,000 with college education looking for work at the time of the inquiry.

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[1] *Philippine Weekly Review*, 18 Oct. 1963, Vol. XVI, No. 58.
[2] Bureau of Private Schools, 1961/62.
[3] *Journal of Philippine Statistics.*

Two factors, then, are involved. Far more students are studying 'professional' courses in colleges than are ever likely to find full employment in the profession, first, because there is a surplus of candidates to jobs; second, because a fair proportion of them have not reached professional standards. Moreover, by entering an academic course of poor quality they miss the opportunity of entering a practical training at technician level, which would have equipped them better for the work which in fact they are likely to do. Firms requiring technicians can in fact choose from scores of applications from graduates, but find few with practical knowledge of a technical job.

PARTICULAR REQUIREMENTS FOR HIGH-QUALITY MANPOWER

The purpose of this section is not to estimate total requirements in particular sectors, nor total desirable outputs from education and training, but to give a very rough estimate of the requirements of skills of full international quality which would be desirable if the Philippines is to make a real success of its economic progress.

I have approached this in two ways. First, by looking at possible requirements at university graduate level for certain key types of occupation—engineering/technology, agriculture/associated natural sciences, doctors, teachers. Second, by a rough total of Category I plus Category II posts which might need filling with fully qualified university or post-secondary staff by analogy with other countries in the area.

Industry and technology

Although the Manila area gives a marked impression of industrialization, it is deceptive. Manufacturing industry accounts for only 11.9 per cent of total employment (9,395,000 total employed, May 1961); excluding those self-employed and unpaid family workers, the actual figure for industry is 487,000. However, those employed in some 2,000 major manufacturing establishments amounted to only 181,242 in December 1961,[1] and the World Bank Report estimated that organized manufacturing (five workers and over) accounted for less than 3 per cent of the labour force in 1960, i.e., about 250,000. In contrast to manufacturing, agriculture takes up 60 per cent of the total employment; mining and quarrying, construction, electricity, etc.,

[1] *Journal of Philippine Statistics*, July-Sept. 1962.

only 3.3 per cent. The figures for organized manufacturing industry represent about 25 per cent more than the 1960 total for Malaya and Singapore, and probably both countries expanded at similar rates up to 1962. Target figures for Malaya/Singapore in the early 1970's would be about 5,000-6,000 professional engineers for all purposes, requiring an output per annum to maintain of 200, and to increase of 300-plus. It would be reasonable to assume that an output of 400 fully qualified engineers per annum would meet the high-quality needs of the Philippines, with a matching output of 200 per annum physical scientists at university level for research and specialized work. The number of registered engineers (see above) almost certainly includes a large proportion not working in posts for which full professional qualifications are needed.

Agriculture

It is extremely difficult, without a detailed field survey, to ascertain the actual numbers and effectiveness of the Philippines agricultural advisory service. Inquiries in early 1963 revealed a staff of about 1,700 in the Extension Service, but the amount of field work actually done is hard to estimate. Certainly in some cases a single officer, without official transport, was attempting to serve 30 *barrios*, which is a hopeless task. There are about 27,000 *barrios* in the Philippines, and a target might be to have one field worker at the lowest level to 5 *barrios*—about 6,000. For supervision of this force it would be reasonable to suggest about 1,500 officers at diploma level and about 600 full graduate officers with some post-graduate experience, for research and policy decision. But, supporting this Field Advisory Service, which is essentially executive (with applied research for 'trouble shooting') would be needed a force of university graduates at least three to four times as large for the basic research (botany, plant pathology, plant genetics, and the corresponding sciences for soil, animal husbandry, water control, forestry, etc.). This would imply a university staff of high-quality graduates of about the following order:[1] *agriculture:*[2] field force, 600; background, 1,800; *veterinary:* field force, 300; background, 50; *forestry:* field force, 150; background, 50; *fishery:* field force, 75; background, 25; *water, survey, geology, etc.:* 200; total 3,250. These figures do not allow for graduate teaching staff in the universities and agricultural colleges, for which another 500 would certainly have to be allowed. A total stock of 3,750 would involve an output of 150 per annum to maintain; but to reach these figures of high-quality staff would justify an output of 250 per annum for the next ten years. This 'high-quality' figure is vastly below the present output of first degrees in agricultural subjects, which is well over 1,200 per annum.

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[1] These figures are, of course, not inclusive of diploma-level and junior field staff. For the Field Service these might be 1,500 and 6,000 respectively, for agriculture alone, and perhaps 2,000 and 8,000 respectively for all services.

[2] Agriculture including all crops, animal husbandry, soils, pest-control, storage, soil science, etc.

No picture is given by these figures of the actual situation in the Philippines, about which a word is necessary. There has been a widespread recognition that the problem of peasant agriculture is partly a problem of tenure (hence the recent tenancy reform legislation) and partly a problem of close contact at *barrio* level with the rural population, so that simple technical advice on fertilizer, seed, crop and animal husbandry, etc., is not only transmitted but personally explained and willingly received. In consequence, several schemes for reaching the *barrio* with community development and agricultural education have been launched. The government PACD scheme (Presidential Assistant for Community Development) is by far the largest, and has operated in 8,000/9,000 *barrios*. A much smaller, more intensive scheme, PRRM (People's Rural Reconstruction Movement), based on placing a young graduate for two years in a single *barrio*, has been in operation in central Luzon, covering about 90 *barrios*, and in certain other small areas. Without detailed comparison, it is enough to say that the PRRM has demonstrated the great effectiveness of close contact and of a highly practical approach to simple problems of agriculture, health, literacy and village organization. It is clear that no country can afford to put a highly trained graduate into every village, but there are lessons from the PRRM which are of national significance. Apart from its evident virtues, it clearly needed far better technical support. It would therefore seem important that the Ministry of Agriculture, and other departments where appropriate, should create a far more unified extension service, reaching to village level and co-operating with local health education services, so that contact with the *barrio* is maintained at a single point with a variety of specialisms 'on call' for special purposes. Without this, confusion and conflicting advice from different agencies will quickly disillusion the peasant farmer.

Medical

It is thought that between 10,000 and 13,000 doctors are in practice in the Philippines, with a grossly distorted distribution, so that there is 1 : 700/800 in Manila and as little as 1 : 10,000-plus in many rural areas. The proportion for 29 million population in 1962 is from 1 : 2,900 to 1 : 2,230 according to the stock figure chosen. About 1,300 medical degrees were given in 1961/62. It is, of course, useless to expect distribution to be even; and in consequence a fairly high total is needed if the concentration in Manila is assumed to continue and the rural strength is to be improved. For a population of 39 million in 1970, 20,000 doctors would be a generous provision.

Stock 1962	*Wastage by 1970*	*Required 1970*	*Output required 1962-70*
13 000	4 000	20 000	11 000

It would appear, therefore, that an output of 1,100 doctors per annum would not be too small to reach this target. To create an eventual field force of 25,000 by 1975, when population will be nearing the 50 million mark, would need an annual output of over 1,500 in the 1970-75 period.

These figures, based on a target of one doctor to 2,000 population are, however, extremely high for South-East Asia. Nor does there seem to be any socio-economic method of inducing doctors to serve in the villages. Certainly the Philippine peasantry cannot pay enough in fees to support a local doctor's practice; and the provision of a government service is anathema to the opponents of 'socialized medicine'. In consequence, to continue to produce these large numbers of medical degrees would result, in all probability, in a yet larger emigration of doctors overseas and little improvement in the rural health service. It could also overstrain the medical schools and perpetuate the overcrowding and high failure rates which now exist. By no means all those who obtain their medical degree are able to pass the State test which enables them to practise as registered physicians.

It would probably be better to adopt a system, widely used in developing countries, of establishing a corps of well-trained medical assistants[1] to be the front-line troops for the villages, as a government service, retaining the fully trained doctors at the smaller provincial towns and district administrative centres, where a fuller medical establishment (beds, equipment, staff) could be available.

It is therefore suggested that no attempt should be made to attain a target of 1 : 2,000 fully qualified doctors, but to raise the field force more slowly to a level of about 16,000 fully qualified men in practice by 1970:

Stock 1962	*Wastage to 1970*	*Required 1970*	*Output required 1962-70*
13 000	4 000	16 000	7 000

This involves an output of about 875 doctors per annum and would give an over-all proportion of 1 : 2,500 on a population of 39 million in 1970. This is actually a reduction in output on present figures, designed to enable the colleges to improve quality. This would give time for social measures to improve distribution and could be supplemented by rural medical assistants in the meantime. An extra 150 per annum should be allowed for supporting sciences.

Teachers

There were in 1961 about 24,000 teachers in secondary schools and 10,000 in colleges in the Philippines. A high proportion in the collegiate level were not, however, employed full-time. There is, perhaps, a need for 20,000 full university graduate teachers for secondary and higher education, assuming that the two lower forms of secondary schools do not need university graduates to teach them. A force of 20,000 would need an annual output of 800 to maintain it at strength; initially perhaps 1,250 should be allowed in order to catch up on arrears of numbers and quality and to allow for expansion.

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[1] In Tanganyika they are called 'rural medical practitioners'; in the South Pacific, 'assistant medical practitioners'.

Possible output of high-quality university graduates

The special groups mentioned in the four preceding sections—engineering and supporting sciences, agriculture and biology, medicine, and teaching—probably account for about half of the total number of high-quality graduates needed. Law, economics, accountancy/commerce, arts (other than teaching), and science (outside agricultural biology, engineering and technology), would need the other half. Thus the output required per annum becomes: agriculture and supporting scientists, 250; engineering and supporting scientists, 600; medicine and supporting scientists, 1,000; teachers (collegiate and upper secondary), 1,250; other, 2,500; total 5,600.

If we now turn to some estimate of the global numbers of Category I and Category II posts which might be likely to exist in the Philippine economy by 1970, remembering the great weight of rural population and the still relatively small industrial sector, the figure is certainly to be put at over 1 per cent and below 2 per cent (the Malayan figure), allowing for a gradual rise of national income per head, but one which would be unlikely to reach more than £65-£70: well below the Malaysian £100 of today. An annual output of 5,600 high-quality university graduates implies the annual replenishment of a stock of 140,000. Allowing three Category II posts for every Category I (a somewhat small figure, but the Philippines might not exceed this in ten years) the Category II force would be 420,000, giving a total Category I plus II 560,000 on a population of 39 million, i.e., 1.4 per cent. If the Category II figure is raised to four times Category I (560,000), the percentage becomes 1.8 per cent, and this seems on the high side.

It must again be emphasized that these figures refer to posts, or employment opportunities, requiring high-level qualifications and training; not to the total output of students with nominal qualifications nor to the total stock of graduates from high school and college (which is already considerably higher).

EDUCATION AND MANPOWER POLICY

It is now possible to see the Philippine education situation in some kind of manpower perspective. What is required, if the foregoing analysis is roughly right, is 5,600 high-quality university graduates per annum, and 16,000/20,000 high-quality post-secondary trainees per annum. (About 6,000 of these would be needed for primary education alone, and the remainder would be readily absorbed into industry, commerce, agricultural extension and sub-professional medical services.) These post-secondary figures exclude the output necessary for high-quality university entrance.

It is easily within the capacity of Philippine education to produce these numbers. The University of the Philippines alone, with an enrolment of over 16,000, ought to be able to produce more than half of the university graduates, and the remainder would come from those private universities which maintain a high standard. There is no implication whatever that graduates from private colleges are always of lower quality; on the contrary, some colleges and universities have produced students outstanding in any company and in all fields. There is, however, still a large output from private universities which is not up to the 'high quality' requirement. If we remember that Philippine secondary education is complete after a total of ten years in school, it would be reasonable to regard the next three years in such colleges as the completion of a secondary education. In a great number of countries in the world, 12 years is a normal period for completing the senior level of secondary education. In South-East Asia it is 13 years to university entrance in Malaya, in South Viet-Nam or Cambodia 13 years also, in Thailand 12 years, in Burma 10 years and in Indonesia 12 years; in East Africa it has been, until recently, 14 years, now being reduced to 13. On the French analogy, the tenth year would correspond to the *brevet d'enseignement secondaire* (or, in the English system, Cambridge Overseas School Certificate, taken in year 11); the twelfth year could be regarded as the first *baccalauréat* and the thirteenth as the second *baccalauréat*, leading straight into a university course at the age of 18/19.

There are a number of educational and psychological problems to be met if this were accepted in principle. Clearly, some new and widely accepted standard would have to be set to distinguish 'collegiate' (years 11-13) from 'university' (years 14-16) courses. There is great flexibility in nomenclature, including the use of 'master's degrees', 'honours degrees' and 'post-graduate schools'. A start has already been made in establishing a centre of advanced studies on the campus of the University of the Philippines, admitting from any university with high enough standards. The basic fact is that it takes 12 to 13 years to bring children entering school at 5 years old to the point of entry of high-quality universities anywhere in the world, including countries with a high standard of primary and secondary education. The Philippines is not among the countries where secondary and university education is so scanty that desperate measures must be taken to get more university graduates more quickly. On the contrary, there is ample provision with secondary and collegiate schools running up to year 13. From a manpower point of view—that is, having regard to the efficient completion of the Philippine socio-economic plans—it is certainly necessary that a proportion of these students receive a full university training from an entry at year 12 or 13, so that the top level of the economy and of society is staffed with a quality which the Filipino people has proved it is well able to produce.

There are complex problems for discussion and agreement, and many possible solutions, many possible nomenclatures. But the basic point is that a qualification gained after 12 or 13 years of education, at age 18, is not comparable to a qualification gained after 15 or 16 years, at age 21, unless there is something radically wrong with the longer course. The second major issue lies in the type of education in years 11-13. Some clearly will be designed to lead on to full university quality with another three years of study. But some should be followed by practical vocational training. The Philippines, despite its vocational schools and colleges, may still be producing too many academic and too few practical students. For the future technician, the post-high school collegiate years should be increasingly related to his actual prospects, and the training institutions must be there to receive him when he emerges from academic studies.

In broad outline, therefore, the manpower suggestions made here:

1. Recognize the broad base of higher education which Philippine enterprise has so remarkably created.
2. Propose that the time has now come to consolidate and differentiate.
3. Suggest that the completion of ten years' education (high school) is the entry point for artisan and junior commercial training (Category III posts).
4. Suggest that the completion of three years' collegiate education (*baccalauréat*) is the entry point for Category II training (primary teachers, technicians, sub-professional medical, agricultural and similar staff).
5. Suggest that a further three years' full university course is needed to provide full international university quality (Category I).
6. Suggest that the Philippine economy will absorb an output of about 5,500 or possibly 6,000 full university graduates and about 16,000 to 20,000 fully trained post-*baccalauréat* graduates per annum, reaching a higher manpower employment of about 1.5 per cent of population.
7. Suggest that the growth of employment opportunities for the output from secondary and collegiate education depends almost wholly on success in modernizing and raising the productivity of the rural peasant economy, and upon the extension of social, medical and agricultural services to it on a massive scale.

These suggestions—and they are no more—tackle only one aspect of an immensely complex social problem. Many other issues will, no doubt, be considered in the study as a whole, which is concerned with more than 'manpower'. I hasten to add that these proposals do not imply a sudden new unemployment problem for the existing holders of degrees. Rather, they recognize squarely that a large proportion of these men and women are in fact doing Category II jobs (and quite a large number are also unemployed); and that a larger number of real Category I qualifications is needed. The proposal that 5,000-6,000 students per annum should enter a high-quality university course at about year 13 will both hold them off the labour market for three years and provide the Philippines with a trained striking force worthy of the great economic and social potential of the country.